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CONTENTS – SEPTEMBER, 1960

1. Pioneering EDP in Finland 2
" . . . it is beginning to lose its glamour, but it is constantly improving in performance . . ." *Reijo K. Pukonen*

2. Writing Readability into Technical Articles 6
Part II of a Three-Part Article
(an ". . . assault upon opaque prose.") *John Seward Fielden*

3. Are Procedure Bulletins Worth Their Cost? 9
" . . . it does not necessarily follow that the . . . routine is improved just because it is put into writing." *Norman H. Pike*

4. How Effective Is Your Flow Charting? 13
"The biggest advantage . . . is that related basic procedures can be placed in one view." *Alfred L. Palmer*

5. Sustaining Productivity through Management Efficiency . . . 16
"No nation can . . . stand still economically . . ." *Peter C. Briant*

6. Operations Research: A Keystone 22
"The objective is to provide quantitative bases for executive decisions which will result in improved operations." *Maurice F. Ronayne*

7. The Significance of Non-Significant Part Numbers 27
" . . . a logical assignment for a systems man." *Raymond P. Gauer*

8. Your Records Management Program 30
" . . . we must set up a time schedule and a plan to implement the program." *John H. VanNest*

Book Reviews 35

Automatic Data Processing Systems
Management in the Industrial World
Measurement and Evaluation of Organizational Performance
Motion and Time Study
Programming Business Computers
The Punched Card Data Processing Annual
Work Improvement

Worth Reading 38

Editorial: International Cooperation 40
Peter Uriarte

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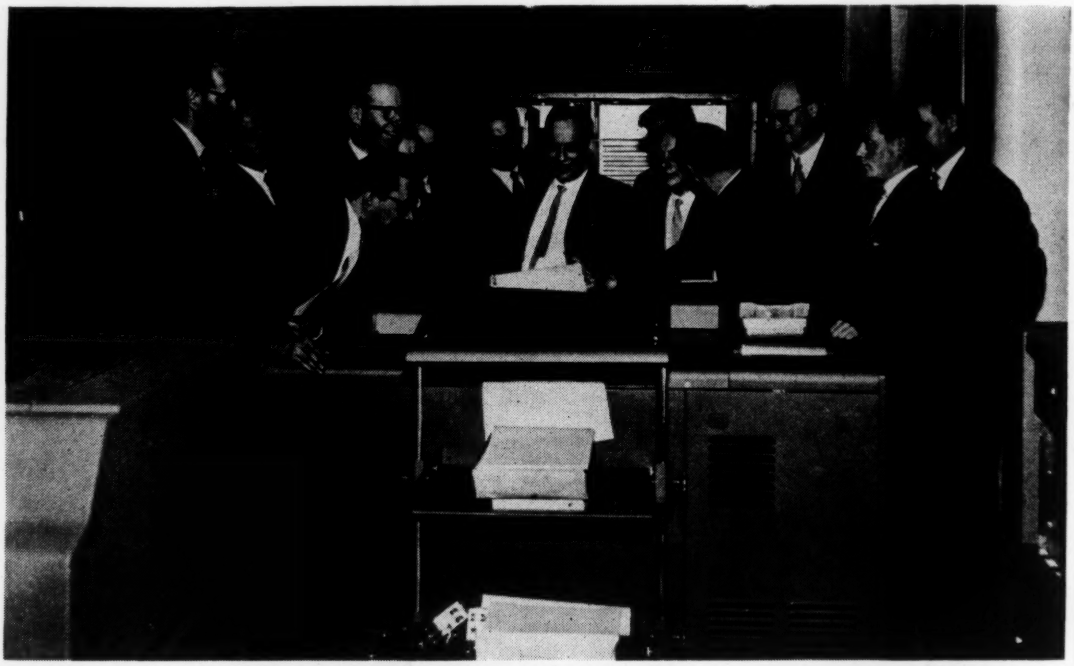
Pioneering EDP in Finland

A CASE STUDY
A CASE STUDY

Reijo K. Pukonen

▶ About five years elapsed from the day when the electronic computer first appeared in commercial use to its arrival in Finland. During those years several Finnish companies had shown serious interest in this new tool of office automation, but it was not until 1958 that the first installation materialized. In 1958, the Post Office Savings Bank of Finland acquired a computer showing again that its reputation as a modern, though long established, bank is well founded.

Reijo K. Pukonen graduated from the Helsinki School of Business Administration in 1954. In 1956-57 he studied at the University of Michigan School of Business Administration on a United States Government grant. He is a member of Beta Alpha Psi. Since 1957 he has been employed by the Post Office Savings Bank of Finland; since 1959, as a department head in charge of accounting.



Our author, Reijo K. Pukonen, is second from the right

General Information

The Post Office Savings Bank of Finland was founded in 1887 and handles about 1,500,000 savings accounts; this means that every third person in Finland holds its passbook. At the close of 1959, the total balance of the savings accounts was 43,120 million marks (U.S. $135 million), or about 10 per cent of the total deposits of all the financial institutions of the country. In addition to the Helsinki head office and branch offices located in 6 other towns, the savings business is carried on in 2,169 post offices throughout the country.

Deposits and Withdrawals

Funds can be deposited and withdrawn by means of a Post Office Savings Bank passbook at any post office. Deposits are certified by affixing to the passbook savings stamps of various values, or deposit tickets sent by the head office. There are about 3,500,000 transactions a year.

Bookkeeping of the Savings Business

The savings bookkeeping is completely centralized in the Helsinki head office. It is based on the use of punched cards maintained at the point of transaction. When making a deposit or withdrawal, the customer fills in the card with his name, the number of his account, and the amount to be deposited or withdrawn. The clerk completes the card with the date and control balance after the transaction, and makes sure that the card is stamped with the code number of the office. At the close of the day's business, he sends all the cards received to the head office of the bank. The transaction cards are followed by total cards giving the total number and amount of deposits and withdrawals.

Automation

Up to 1947, when we had about one million accounts, the work could be handled with ordinary bookkeeping machines. As the operations increased, it became necessary to consider means by which the bookkeeping could be done in a more flexible and accurate way and at a minimum cost. The work was transferred in stages to the punched card system, and the results obtained were encouraging. The punched card installation was continuously updated with the most efficient machines available. After about 10 years, further expansion, however, proved that even this method was insufficient to cope with all the work. In the most extreme cases, there was an unavoidable delay of two and a half months between the transaction and its posting. Posting to the accounts could be done only once a month, because of the slow and complicated procedure. Something more radical had to be done.

In the spring of 1957, a study was made of the possibility of finding a satisfactory solution to the problem by a further development of the conventional punched card installation. This would have meant, however, an increase in personnel, space, and machine costs without giving us fundamental improvements in the system.

We then began to search the possibilities of EDP as a cure for our problem. A three-man team was given the full-time assignment of making the study and comparing the competitive offers of various manufacturers. Both punched cards and magnetic tape were considered as the input-output media, but in spite of important advantages in some respects we had to give up the tape. Inquiries about account balances which come in by phone must be answered immediately, and the tape equipment available could not solve this problem. With cards it is easy to get the desired information by pulling out a record from the "balance" card file.

Two alternative offers had to be put aside because of difficulties in balancing input-output speeds with our processing time requirements. In December, 1957, the final decision was made to obtain an IBM 650 computer, for which we had already placed a tentative order. In addition to the basic equipment, we needed another card read-punch and two tabulators to work either in- or off-line. Before signing the contract, we had made some rather complete trial runs on a similar computer in Sweden. The detailed systems work, programming, and final test runs had to be made within eight months because our equipment was due to arrive in September, 1958.

We kept our schedule, and so did the manufacturer. Although it required some extra arrangements, the basic equipment arrived at the end of September. The central unit, the power unit, and one of the card read-punches came by chartered flight from the factories in France, the two tabulators came from Canada, and one card read-punch from the U.S.A. The German IBM factories did their part by providing us with the newest equipment for punching and control punching. Sorters and collators were the only machines that we kept from the old installation.

Installation

This international collection of equipment had yet to be installed and the various units tested together before we could apply our stream-lined systems on the new equipment.

There happened to be a change in the rate of interest just at the beginning of October, and as we carry on the balance cards the current year's interest calculated to the end of the year it was necessary to recalculate the interest and punch a new balance card for each account. This was an unexpected item on our conversion schedule according to which the change had to be completed in December. It took us a month to get the job done, but after all it proved to be a very suitable and even desirable "dress rehearsal" for the actual conversion.

The service engineers still needed several hours daily to keep the equipment in working condition, the balance cards were in all respects not suitable for the new computer, and more training for the operators was badly needed. All these factors slowed down the job, and the pressure in meeting the deadlines kept on rising. Finally, the extra job was done, and we had a clean balance card file, experienced service engineers, and operators ready to start the actual conversion. The annual balancing of accounts, which is quite comparable to the above job, took less than two weeks, and in January, 1959, we gave away most of the old machines.

We were now relying completely on our new equipment in the savings business accounting and in the statistical work combined with it. Figure No. 1 shows a rough flow chart of the accounting routine. The dual cards are punched and verified after which an independent working tabulator checks for agreement the total achieved from the transaction cards with the total figures sent in by the post offices. The dual cards are sorted into account number order, and the corresponding balance cards are pulled out from the file. To reduce the tedious and unproductive collator work, we have divided the balance card file into "active" and "sleeping" parts. If there is a transaction on a sleeping account, the balance card is pulled out by the clerks.

When the material is ready for posting, the computer *in one single run* performs the following steps:

1. Checks the balance cards for ascending order.
2. Checks the account number of the transaction card against that of the previous balance card.
3. Tests to determine which one of about 20 different types of transactions is to be processed, and chooses the right program branch for this.
4. Calculates the interest to the end of the year for each transaction card.
5. Accumulates totals on three different bases for statistical purposes.
6. Accumulates totals of old and new balances and all types of transactions for control purposes.
7. Prints on the tabulator a complete posting list.
8. Tests the control balance given in the transaction card for agreement with the figure reached by the computer.
9. Punches the new balance cards.
10. Punches and prints in case of error an error code number in the new balance card and new balance line on the posting list.

Accounting in the Savings Business, Finland

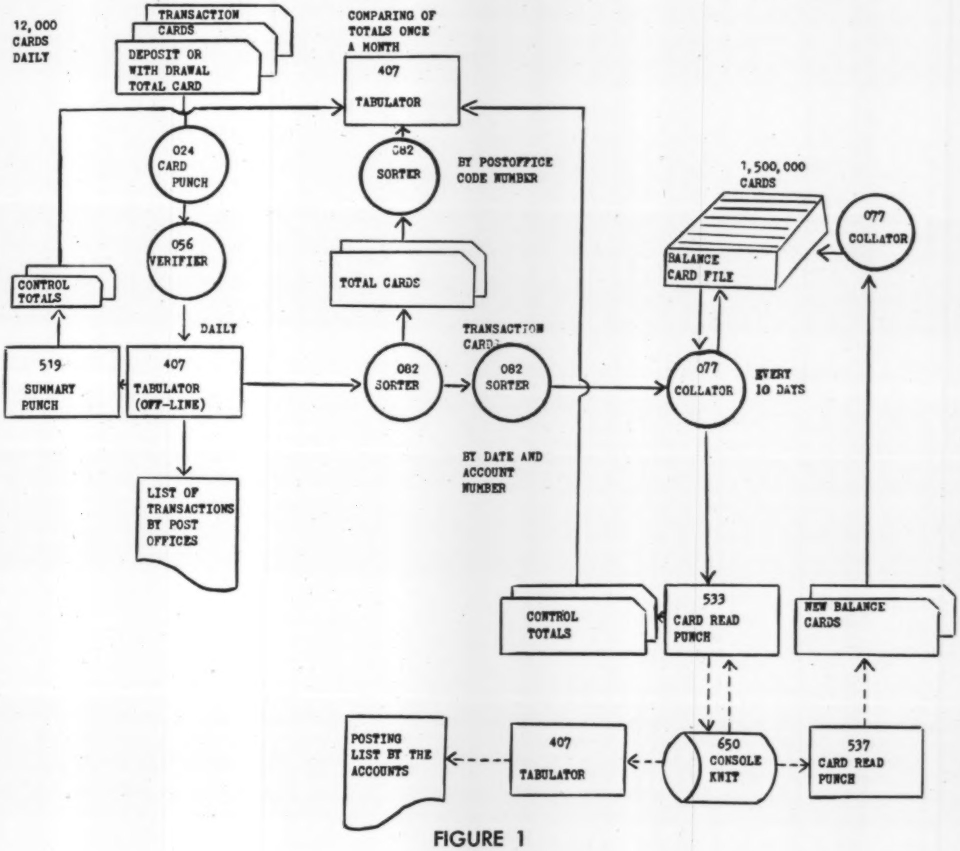

12,000 CARDS DAILY
TRANSACTION CARDS
DEPOSIT OR WITH DRAWAL TOTAL CARD
COMPARING OF TOTALS ONCE A MONTH
407 TABULATOR
024 CARD PUNCH
082 SORTER
BY POSTOFFICE CODE NUMBER
1,500,000 CARDS
BALANCE CARD FILE
077 COLLATOR
056 VERIFIER
CONTROL TOTALS
TOTAL CARDS
DAILY
TRANSACTION CARDS
519 SUMMARY PUNCH
407 TABULATOR (OFF-LINE)
082 SORTER
082 SORTER
077 COLLATOR
EVERY 10 DAYS
BY DATE AND ACCOUNT NUMBER
LIST OF TRANSACTIONS BY POST OFFICES
CONTROL TOTALS
533 CARD READ PUNCH
NEW BALANCE CARDS
POSTING LIST BY THE ACCOUNTS
407 TABULATOR
650 CONSOLE UNIT
537 CARD READ PUNCH

FIGURE 1

Even if this list is incomplete, it is easy to see that the job would require more than ten different runs on conventional punched card machines. The posting that previously was done only once a month now takes place three times a month, and should it become necessary, it is possible to shorten the period still more. This was our main goal, but almost equally important are the benefits reached by the integration of the work and the rise in reliability and usefulness of the data that we attain as the result of the new system.

Conclusion

At this time, we do not need the whole capacity of the equipment, and so it is also used for outside purposes, mainly for mathematical and scientific problems.

For about a year, ours was the only EDP installation in Finland, but now it has been followed by three others and there are several new ones on order. When our computer arrived, we received very favorable publicity. Even the cartoonists in the daily papers called attention to the occasion.

At the inauguration, speeches were given by the Minister of Finance, Mr. Hetemaki, and the Bank's Director General, Mr. Aura (fifth from the right in the photograph). The inauguration was observed by the press, radio, and television. A few weeks later we arranged a new TV program for which the computer solved mathematical problems, printed maps of various European countries, and played games. Now it is beginning to lose its glamour, but it is constantly improving in the performance of the actual work for which it was installed. **s/p/a**

Writing Readability into Technical Articles

PART II

John Seward Fielden

This is Part II of a three-part article which discusses how to achieve more readable writing in technical articles. Part I appeared in the May issue. The article was solicited by *Systems & Procedures* for two reasons: (1) To help S.P.A. members prepare manuscripts about their experiences in "systems" work as they evolve in business, government, and industry and (2) to stimulate the type of article Price Waterhouse & Co. is trying to support through its annual award to the member who writes the best article published in this magazine each year.—Ed.

Methods

▶ Sections of articles which deal with the logic of the approach or solution, or with assumptions or theories on which the work is based can be made more readable. Inexperienced writers, for example, often create in the "method of investigation" or "apparatus" sections of experimental articles nothing more than a list of survey techniques or equipment, undifferentiated as to the relative importance of each item listed. Nothing will squash interest in a section such as this more than such an itemization. Judicious use of a detailed exhibit or chart will eliminate the necessity of finding something to say about each item, and comment in the text on the principal or major aspects will be that much clearer, and readable. Another device is to relegate subsidiary matters to a footnote or appendix, if it is necessary to mention them at all.

Of "procedures" or "methods of testing (or solution)" sections, much the same can be suggested. Again, a blow-by-blow detailing of simple operational procedures need not be gone into. The "First we opened the water faucet to see if the water was running . . ." type of beginning so dear to undergraduates writing up laboratory experiments commits the writer to a chronological organization that consumes time and tortures the patience of the reader. Specific instructions to writers are, in this area, impossible, since so many differing types of organization are possible. One suggestion, however, is always valid. Begin with the general statement of what the procedure consisted of, stating in a topic sentence just what was done: e.g., "three tests were run at . . ." *Necessary* detail then will follow in the order requisite to support the general topic sentence.

So too can the "theory" or "principles" section be made more readable by a writer who keeps before him the image of the generally educated technical man who will read the article. Especially in such a section, there can be little "popularization," but there can be a realization that much of what is common knowledge to the writer will probably not be quite so common to others. The writer who gives too much background theorizing, of course, will find his material cut by editors jealous of space, but this is in itself no reason for cutting the theory section to some final equation not even put into a more generally apprehended context. Often, one or two sentences of concrete illustration will clarify a matter of theory or principle, so that it will actually read more quickly than the shorter version without such help.

Such detailing of theory often involves the use of a list of nomenclature which should be placed early in the paper, either in a separate section, or (if brief) in a footnote to the theory section. About lists of nomenclature one word can be said, and that is that the writer should stick to accepted symbols more readily grasped by readers than symbols privately composed. Most journals will supply the aspiring author with lists of symbols available and in use; if no such list is available, then consulting some previous issues of the journal will afford an indication of what is in customary use.

Main Text Organization[1]

Once the writer has finished writing the introductory elements of his paper, he faces an even more difficult job. The organization imposed upon the first section of his paper discussed above is fairly standard and logical. Certainly the reader has to be told the subject of discussion, the approach or method of solution, and so on. But now the question arises as to how to organize his discussion of his main topic.

The writer can, of course, sit down and write and hope for the best, being perfectly willing to jettison several weeks' or months' work because the final product is a verbal mystic-maze. But this method is far inferior to the making of an outline in advance. In so doing, the writer has the opportunity to classify and put his thoughts into order before embarking on the actual writing, rather than ultimately being forced to work through many revisions of a hastily composed manuscript.

By means of an outline, the writer is allowed to gain quickly an adequate mental picture of what he is trying to accomplish. Faulty progressions of thought can be corrected, nonessential information discarded, and supporting evidence listed in subdivisions. Almost as important, the writer has the opportunity to see, arising from the bare bones of his outline, the paper as it would be if completed, and he has the opportunity to "revise" the paper and make it more readable even before he writes it.

Writing and reading are opposite sides of the coin, both graphic symbolizations of mental processes for the purpose of normal communication. The illogically organized piece of writing, like a rubber stamp, imprints upon the mind of the reader its illogicality. The reader who is interested enough can unscramble the imprint and in effect write in his own mind the article that the writer should have written in the first place.

Although the inventive mind can formulate infinite variations upon possible expository organizational patterns, there are really only three basic ones: the logical, the chronological, and the psychological.

Psychological Organization

Of these three, only the psychological will not follow a normal logical pattern of development. Here the "logic" will be entirely on the part of the writer, and usually unknown to the unsophisticated reader. *In this pattern, the writer determines the order of presentation of his material by considerations concerning the effect each point will have upon his intended readers.*

Suppose a proposal requesting immediate approval for a research project is to be written. The most important fact giving rise to the proposal might be the need for a considerable amount of financial backing. Yet to make this request the first remark in the proposal might not be wise psychologically. The importance of the proposed research, the benefits which might accrue to the company or institution if the proposal is approved — such matters as these should be developed prior to the mentioning of such highly important but psychologically negative matters as expenses and man-hours taken away from other projects.

Even in purely scientific publication, it should not be held that there is in practice no place for the psychological organization of material, especially when one's aim is (even if ever so subtly) the obtaining of readers for one's work. The more popular the publication, the more obvious a psychological organization of material will be found. But even in the purely technical article, there is nothing wrong certainly in beginning one's main text with material of greatest interest to the reader. Why should it be considered more scholarly to move from the less interesting to the more interesting than to move from the highly interesting to the less, buried somewhere in the center of the paper?

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[1] An abridgement of this portion of this article appeared in *Mechanical Engineering*, March, 1959, pp. 46.

Chronological Organization

The second pattern of organization, the chronological, needs little explanation. Using a time relationship, the writer reports that first this was done, then that, proceeding from the first event reported to the last. Chronological organizations are commonly found in sections of papers which give instructions concerning how to operate machines or complete processes. In such cases, this pattern is satisfactory; in others it is not, for it does not allow the writer to distinguish nicely between the importance of items reported. The first event in time is not necessarily the first event in importance. The old saying "First things first" may not pertain to those first *in time* at all.

Yet to the inexperienced writer, a chronological organization of his material comes immediately to his mind when he seeks to report his investigation, for, after all, has not the material he has gathered been obtained chronologically? Ask a person what he has done on a particular day and he will answer, "Well, first I got up feeling rather tired, but after I had my breakfast . . .", and so on. It will take genuine effort of his intellect to organize his answer in categories more meaningful to the listener. Just as in the case of the reader of a chronogolically organized article, his listener will have to sort through the chaff of inconsequentials to categorize logically the given answer. To tie this observation in with readability, let me underscore the point that, with the exceptions noted above and perhaps some few others, the chronologically organized article is less readable and requires more effort on the part of the reader than does the article which is organized logically.

Logical Organization

Far more readable are articles which are organized logically, according to a deductive organizational pattern which leads the reader's mind carefully from the general to the specific, or from given premises to their necessary conclusions. The experienced writer realizes that material is most readily assimilated by the reader when the general proposition is placed first and then supported by specific detail. The key to much clear and readable writing is this maxim: never keep secret from the reader the direction in which one's development of a topic is heading.

One other logical pattern of organization, the inductive, is useful in certain situations where for clarity and comprehension it is necessary to move from the particular to the general. Such situations typically arise in describing a system which is generally too complex for immediate comprehension. In this case, it might be wise to begin by discussing particular parts of the system rather than its totality, gradually building up, section by section, the complete design in the reader's mind. In another case, a simple analogy might be used, and from this particular, once made clear, the complex organization or mechanism verbally constructed.

Headings

Once established, the organizational pattern should be reflected in the headings and subheadings intended to increase the readability of the paper. Such headings are like road signs. The writer is, let us say, the operator of a taxi which must drive down a winding street in the heart of a most interesting city. The reader is his rider who, although he originally set out to travel to a destination at the end of the road, will not hesitate to alight promptly if he feels that the driver is not taking the right route to the destination. Furthermore, if he can see where he is being taken, he is less likely to be distracted by, say the sale of golfing equipment in a store window on the way.

In the case of the article, the subheading-road signs serve not only to inform the reader of the integral parts of the discussion and the steady progress toward conclusion, but also serve to force the writer sharply to organize his paper and not to wander like a drunken driver through traffic-laden streets, coming up sharp at dead ends, and crashing to complete stops against unforeseen obstacles. *(Concluded, November Issue)* **s/p/a**

Are Procedure Bulletins Worth Their Cost?

Norman H. Pike

▶ Most companies of any size have experimented at some time or other with standard practice bulletins, office manuals, or standard operating procedures. Although the titles of such procedural manuals vary among companies, the finished products are essentially the same. They are a series of written bulletins describing office and administrative procedures to be followed by employees. The purpose of this article is to consider some of the problems involved in preparing, using, and maintaining them and some of the policies established, therefor, in The Maytag Company.

Often the preparation of procedure bulletins is assigned to the controller's division but regardless of who prepares them, an accountant will probably eventually be asked to evaluate them, for procedure bulletins can cost a great deal of money.

At first glance their cost may seem obvious. If the bulletins are to be useful, they must be carefully researched and written with the result that, at today's salary levels, it is costly to prepare and issue a series which describes administrative routines and practices in more or less detail. However, observation of company practices in this matter makes one wonder if the fact of cost is as obvious as it would seem. Some companies start a *series* of procedure bulletins and drop it when they discover how much it will cost and, of course, this is merely one side of the coin. The other is the difficulty of finding and training competent people to describe procedures satisfactorily.

The question to be faced then is: *Is a complete set of procedure bulletins worth what it costs to prepare and maintain it?*

Factors

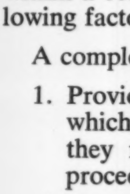
Advocates of a series of bulletins covering all clerical and administrative procedures within a company generally advance the following factors to support their position:

A complete series . . .

1. Provides a standard reference guide which employees can consult when they need information on unfamiliar procedures.
2. Eliminates duplication in paperwork.
3. Promotes accuracy and completeness.
4. Simplifies the supervision and training of new employees or the transfer of employees to new jobs.

Limitations

1. A procedure manual is a handy reference guide only if you are sure that your



Norman H. Pike, a past president of the Systems and Procedures Association of Des Moines (not affiliated with the national association), is senior systems and procedures analyst for the Maytag Company, Newton, Iowa. He holds both the B.S. and M.B.A. degrees from Harvard. He is also a member of the National Association of Accountants.

employees actually use it to find information they need. Unless a detailed and easy-to-use index is provided and unless the employees are trained to use it and indoctrinated with the importance of doing so, a company may find that in reality employees rarely use the manual because it is too much trouble. They may prefer either to do without the information or to ask someone who may be acquainted with the procedure in question. That is, investigation may reveal that although a complete series of procedure bulletins is available, they are rarely used.

2. Procedure bulletins in themselves do not eliminate duplication or unnecessary paperwork. It is possible to describe a procedure which is full of duplication in clerical work. The analyst who writes it may have described an unsatisfactory way of handling the job and by so doing may in fact help to assure that the procedure goes unchanged. The point is that it does not necessarily follow that the method of proceeding through a clerical or administrative routine is improved just because it is put into writing.

3. The fact that procedure bulletins simplify supervision and training of new employees or the transfer of employees is true in so far as it gives a supervisor a list of things he is supposed to do. On the other hand, there is a certain danger in this viewpoint. In reality the preparation of detailed office instructions may foster poor supervision. When things to be done are too highly structured and circumscribed, particularly when recorded by a staff specialist assigned by top management, the job of the supervisor is robbed of much of its creativeness. The supervisor is reduced to the status of keeping discipline among his clerks and of making sure they follow the manual. This, in time, may result in an automatic following of rules and the development of red tape.

Cost

The strongest factor against a complete series of bulletins is its cost. My organization —a manufacturing company with ten sales branches, but manufacturing operations largely centralized in one geographical location—made a rough estimate of the number of bulletins we would need if we attempted to record every major clerical procedure. We stopped at 347 although the list was not complete. If these bulletins had been written, they would each have run from two to ten pages, averaging perhaps five pages. We estimated that the time alone would cost us better than $60,000. Keeping the manuals up to date would be an additional cost. Would the value of such costly procedure bulletins justify the cost?

A Limited Number

Although we decided it was not practical to prepare a complete series of procedure bulletins describing all the clerical procedures in detail, we have learned from experience that they can be very valuable—if they are limited in number and designed to meet a specific need. For example, a branch office manual is used very successfully in our sales branches. Although the number of procedures involved was small, there was a need for uniformity among these different "offices." The branch office manual was a satisfactory and relatively economical way of handling this situation.

The writing of a procedure bulletin should begin with a felt *need* for studying a procedure; then the cost of the study will be offset either by:

1. A dollar saving achieved by eliminating duplication in clerical work.
2. A reduction in the delay or the errors which result from an inadequate or confused procedure.

A Limited Use

When the procedure has been studied and simplified, we must decide if it is practical to prepare a written description. Simple procedural changes affecting only one department do not normally justify a written bulletin. Only more elaborate ones affecting several departments are "issued." The reasons are:

1. To record the general area of the procedure for which each department involved is responsible.

2. To record the approval of the department and division heads responsible for administration.

The analysts are staff specialists who have no direct authority in the departments where they work except as they are able to persuade department heads to make recommended changes. This, of course, is as it should be, but it does necessitate recording the procedure to show precisely what it was on which the various parties concerned agreed. The written procedure *fixes responsibility* and records an agreement.

Our bulletins, therefore, are not written primarily for reference although copies are available to the supervisors and department heads concerned, and they are occasionally used for reference. They do *not* list in great detail the clerical steps to be followed. We feel that organizing the details of the clerical work is the proper responsibility of a supervisor and should not be usurped by staff specialists. Thus, in our company, the primary function of a procedure bulletin is to get the facts in writing.

Exhibit No. 1 shows an excerpt from one of our bulletins. It demonstrates how the policy which governs the preparation of our bulletins affects the style. The general responsibilities of each department concerned are shown; clerical details are not prescribed. We believe this makes the bulletins easy to read since a supervisor can find at a glance the part of the procedure which affects his area. This after all is the part of the bulletin he wants to read. An initial brief summary of overall objectives orients him to the whole.

Flow charts could probably meet our need but flow charts can be confusing. As analysts, we make flow charts for our own use while we are at work on a project, but we prefer written bulletins for the final record. In that way we find we are less likely to be misunderstood.

Since our reason for working on a procedure is to improve it, we review it at intervals to see if it is working satisfactorily. The written procedure is a useful point of reference in making such an audit because it contains a clear and concise statement of the duties of each department concerned.

Exhibit No. 1[1]

Read paragraphs A through C for brief description of this bulletin.

A. The employee fills out an application to buy a Maytag appliance at the special employee price and obtains the approval of his supervisor or department head.

B. The application is forwarded to the Industrial Relations Department to determine if the employee meets the requirements for purchasing an appliance at the special price.

C. The approved application is returned to the employee, who submits it to the dealer of his choice. The employee pays the dealer the special price.

Departments responsible for administering this procedure.

The employee's supervisor:

1. Gives the employee wishing to buy a Maytag appliance the employee application purchase authorization form (Form No. 700-1 is obtained from the supervisor) in an original and one copy.

2. Explains to the employee the rules of this plan.

3. Inspects Form No. 700-1 after the employee has completed and signed it.

4. Signs Form No. 700-1 if it appears to be in order.

5. Sends the original and the copy of Form No. 700-1 to the Industrial Relations Department at Plant One for all Newton employees or to the Hampton office for Hampton employees.

Industrial Relations Department (or the Hampton office in the case of Hampton employees):

1. Disqualifies Form No. 700-1 if the employee has been employed less than six months.

2. Returns both white and yellow copies of Form No. 700-1 to the employee's supervisor if the form is not properly filled out or if the employee does not qualify to participate in the plan.

Exhibit No. 2[2]

Administrative Bulletins

1. Procedure for Standard Practice Bulletins (7/20/49)

2.10 Release on Consignment (10/27/58)

2.11 Authorization for Release on Memo Invoice: List of Individuals Authorized to Approve (9/1/58)

2.12 Release on Items Which Were Released on Consignment (9/2/58)

2.50 Return of Items Which Were Released on Consignment (9/2/58)

3.10 Returning Appliances from the Warehouse to Production Department for Rework (3/18/59)

4.40 Coding Orders and Sales Correction Reports (3/1/59)

5.10 Cash Disbursements Procedure — for Items Handled through Accounts Payable (4/28/59)

5.20 Cash Disbursements Procedure — for Special Items Not Handled Through Accounts Payable (5/26/58)

Manufacturing Bulletins

7. Waste Material Segregation (3/26/54)

8. Scrap Steel Grade (3/26/54)

9.10 Disposal of Surplus or Salvage Material and Equipment (4/2/57)

9.6 Reporting Scrap: Piece Parts, Sub-Assemblies, Assemblies, and Obsolete or Un-useable Materials or Supplies (1/27/58)

9.8 The Disposal of Waste at the City Dump (6/15/59)

12.1 The Tool Order (4/29/57)

15.1 Requisitioning Operating Supplies (3/2/59)

16.10 The Maintenance Work Order (5/19/58)

17.10 Interplant Transfer Procedure (9/21/59)

It should be emphasized that our policy of carefully selecting the subjects we cover in our procedure bulletins does not result in handling only those subjects which are giving the most trouble at the moment. We try to plan our efforts as far in advance as possible so as to investigate those areas where we think the greatest benefits can be realized. We try to avoid putting all our efforts at those places where we hear the most audible complaints. We know that areas of clerical work which are apparently functioning smoothly may on close inspection actually reveal duplication, confusion, or inaccuracy. There is always a need in systems work to come up with emergency measures to deal with sudden crises in the processing of paperwork, but only by careful advance planning can one achieve an integrated total system approach.

Exhibit No. 2 shows some of the subjects we have covered in the seventy-nine procedure bulletins which we presently have in effect.

Conclusion

To summarize our approach to procedure bulletins, we can say that we try never to forget the high cost of doing a procedures survey. We try to relate the cost of doing the work to the jobs selected for study. Is it worth doing? Can we hope to accomplish something that is worth the cost? We believe this policy and viewpoint have paid off, for we have a series of bulletins which have resulted in improvements in administrative and clerical procedures which have more than offset the cost of preparing them.

s/p/a

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1. This is an excerpt from the Standard Practice Bulletin: The subject is the sale of Maytag Appliances to Employees.

2. This is an excerpt from The Maytag Company's Index of Procedures Bulletins. The complete Index lists seventy-nine bulletins.

How Effective Is Your Flow Charting

Alfred L. Palmer

▶ In a nutshell, here is what good flow charting can do:

1. Provide a ready reference for an analyst, thus saving him countless steps, interviews, and phone calls to find out what is charted.
2. Show relationships among basic procedures and the extent to which they are integrated.
3. Indicate how forms are used and by whom.
4. Indicate the progress the systems department is making as shown by flow charts of different dates.
5. Make a methods analyst into a systems analyst by helping him progress from a consideration of individual methods to an overview of all systems of the company.
6. Promote planning on a company basis instead of on a project basis.

Now that we have reviewed what good flow charting can do, let us test the status of your flow charting ability with the following check off items:

A Flow Charting Test

1. Rate your flow charting as you now do it.

_____superior
_____average
_____poor

2. Check the appropriate space in the following:

a. Are all your company's basic procedures charted?

_____yes
_____no
_____some

b. Are the charts simple, easily read, and easily understood?

_____yes
_____no
_____to some extent

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c. Are the charts keyed to forms and methods charts?

_____yes
_____no
_____somewhat

d. Are the charts reproducible and easily transported?

_____yes
_____no

e. Do the charts read naturally from left to right and preserve continuity in one view of a particular basic procedure?

_____yes
_____no
_____to some extent

f. Does one chart at least show the relationship of basic procedures to each other?

_____yes
_____no

What are basic procedures? Of course, they vary from company to company but can be defined as those which "picture" all the work of a company. *Basic* also means procedures which are necessary to the successful operation of a company. For example, identified below are basic procedures for a financial operations system:

05. FINANCIAL OPERATIONS SYSTEM

A. Procedures for Maintaining Records of Account
  .00 Preparation of Journal Vouchers
  .01 Preparation of Expense Vouchers
  .02 P & L and Balance Sheet Preparation
  .03 General Ledger Preparation
  .04 Expense Ledger Preparation

B. Procedures for Receivables Accounting
  .11 Revenue Receivable
  .12 Miscellaneous Receivables
  .13 Claims Receivable
  .14 Advances to Offices and Employees
  .15 20-3 Receivables

C. Procedures for Payables Accounting
  .20 Vendors Accounts Payable
  .21 Contractors Accounts Payable
  .22 Other Payables

D. Project Accounting
  .30 Non-capital AFE's
  .31 Work in Progress Accounting

E. Cash Control
  .40 Cash Balance Forecast
  .41 Capital Budget
  .42 Cash Book

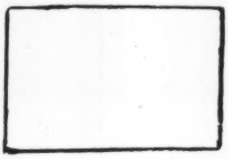
F. Financial Statistics
  .50 Revenue

G. Expense Control
  .60 Expense Budgets
  .61 Functional Costs
  .62 Transportation Costs

H. Tax Calculation and Payment
  .70 Federal Income Taxes
  .71 State Income Taxes
  .72 Sales and Use Taxes
  .73 Ad Valorem Taxes

I. Governmental Reporting
  .80 ICC
  .81 Other Federal
  .82 States

The flow chart illustrated herein meets all the requirements of the flow charting test. It was made from a 127 mm negative of the photograph of the sixteen by twenty-four-inch original flow chart. The symbols used are explained as follows:



Document: Form, report, memo. (Document number in upper right corner, copy number in lower right corner.)

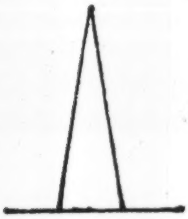
Operation
(Operation number in upper center)

○ *Transportation*

▽ *File*

□ *Inspection* (Operation number in upper center)

Affected Document



Affects Document

Affecting Document

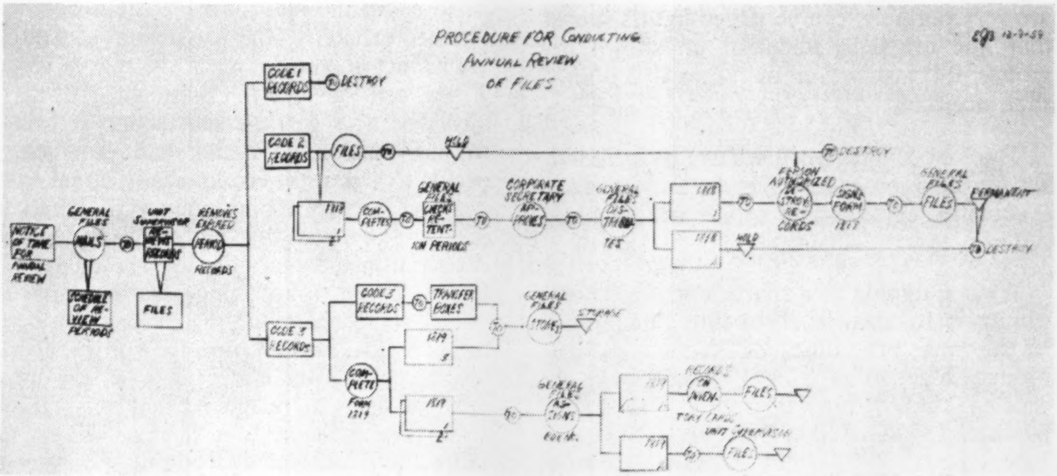
Simplicity in flow charting should be preserved. This one uses only six basic symbols. Such simplicity makes for ease of reading and understandability. Of course, the question of understandability is in order, particularly by the systems analysts for they are generally the users. The question of understandability by persons other than systems personnel leads us in another direction.

Notice that the chart keys forms to the basic flows so that when the question is asked, "Where is that form used?" the answer is readily available from the flow chart.

A forms file should be cross-referenced to the procedures charts, and basic flow charts should be keyed to the methods charts (charts of individual methods which in total make up the basic procedures charts). It is suggested that cross referencing be complete between the forms file, basic flow charts, and methods charts.

Basic flow charts are easily reproducible if they are drawn on translucent paper in pencil which can be reproduced in an Ozalid machine.

Flow charts should always read from left to right. Some procedures cannot be completed in one chart, but a second will usually allow enough space to complete a very lengthy procedure. Continuity is preserved if the charts are cross referenced and can be placed side by side for the complete picture. Vertical flow charts become unwieldy and hard to read when they extend beyond one chart.


PROCEDURE FOR CONDUCTING
ANNUAL REVIEW
OF FILES
NOTICE OF TIME FOR ANNUAL REVIEW
GENERAL FILES
SCHEDULE OF REVIEW PERIODS
UNIT SUPERVISOR
REVIEWS RECORDS
FILES
REMOVES EXPIRED
METHODS
CODE 1 RECORDS
DESTROY
CODE 2 RECORDS
FILES
HOLD
DESTROY
GENERAL FILES CHECKS RETENTION PERIODS
CORPORATE SECRETARY
APPROVES
GENERAL FILES
AUTHORIZED
SIGNS FORM
GENERAL FILES
FILES
PERMANENT
DESTROY
CODE 3 RECORDS
TRANSFER BOXES
GENERAL FILES
STORAGE
COMPLETE
FORM 1319
GENERAL FILES
FILES
UNIT SUPERVISOR
FILES

The biggest advantage of this system of flow charting is that related basic procedures can be placed in one view. If not too many charts are involved, copies can be placed on a vertical surface for a composite view. Colored string can be used to connect the *output* of one basic procedure to the *input* of another basic procedure. Thus flows of forms, reports punched cards, etc. can be viewed at one time and observations made about integration (or the lack of it). With all the elements to be integrated in one view, the analyst can proceed with his analysis being assured that:

1. He has a complete overview which he can study for integration.
2. He can observe the interplay of forms, records, equipment, cards, departments, sections, etc.
3. He can compare more objectively the proposed procedure. similarly laid out, with the original. This helps to indicate where elimination, combination, change in sequence, and simplification have taken place.

When there are too many basic 16 by 20 inch procedures to make conveniently a composite overview (they cover too many square feet), special No. 1 close-up lenses can be placed on a 127 mm camera and 8 by 10 inch negatives made of each 16 by 20 inch chart. This is an economical procedure; the negatives cost about $1.30 compared to about $4.50 if the charts are sent out for 8 by 10 inch positives. Another good feature is that the 127 mm, 2 by 2 inch slides are very portable, can be stored in less space than the originals, and can be shown to groups for instruction by using a 35 mm slide projector.

The 8 by 10 inch positives can be included with written procedures; in fact, they may eventually replace some of the written procedures.

When grouping flow charts, one other possibility is to arrange them into "families." In this way, procedures of "families" when brought together as 8 by 10 inch positives, can be studied for integration and could facilitate LONG-RANGE PLANNING.

s/p/a

Sustaini

Abstract

▶ The purpose of this article is to discuss factors underlying economic growth, to point to the responsibility of business management in promoting and sustaining growth, and to give a conceptual framework for comprehending the role of systems managers in furnishing information on which decisions can be based. Reference will also be made to growth-retarding factors that systems men encounter in their work and that could be the principal factors inhibiting sustained growth in the future. The article appears in two parts; Part II will appear in the November issue.

* * * * *

Productivity and the related topic of economic growth are controversial subjects on which specialists hold diverse opinions. Nevertheless, professional economists are in general agreement that sustained economic growth is necessary in the years ahead. There is also reasonable agreement as to the amount by which our output of goods and services may be expected to increase.

A continuation in our rate of growth is necessary if we are to demonstrate the superiority of the free-market system over the planned economy (the Russian gross national product now increases at the rate of about 7 per cent a year.) Continued growth is also desirable for the satisfaction it brings to individuals. No nation can consciously decide to stand still economically, to take the position that a Utopian plateau of plenitude has been reached, that nothing better can be expected in the years ahead. The mere process of trying to hold things as they are can only lead to economic regression. If we are to keep alive in the future the spirit that has sparked our economic growth to the present, we have to recognize that there is no society so affluent that it need worry no more about increasing its output of consumer

Productivity through Management Efficiency

Peter C. Briant

goods. If we are to enhance the freedom of our people in their capacities as producers, investors, and consumers of more goods and more leisure, we must at least sustain our rate of economic growth. From a more pragmatic point of view, growth as a major policy objective may be justified on the grounds that in a growing economy conflicts between labor and capital are mitigated. In a static society, labor can increase its living standards only by diminishing the income of the owners of capital. In an economy in which the national income is increasing, however, labor's living standards will increase merely by its receiving the same share of the increasing income.

With regard to the actual amount of growth, the Committe for Economic Development predicts that the gross national output will continue to increase by 3 per cent a year, giving us a GNP by 1975 of $725 billion in 1956 prices. This amounts to a disposable income for the average family of $7,100 a year after taxes, in 1956 prices. These figures are to be compared with a Gross National Product of about $480 billion in current prices today and disposable income of $5,300 per family. Somewhat more optimistically, *Fortune Magazine* in its March 1959 issue called its prediction of a Gross National Product of $740 billion by 1970 "a pretty conservative bet."

Sources of Economic Growth

Rates of output of the magnitude cited stem from two sources. In the first place, assuming the work force is fully employed, we can work harder and longer (this is referred to technically as the "labor input" increment). As a second alternative we may improve the effectiveness with which we work (this is referred to as the "productivity" increment). In the next decade we may average approximately a one per cent increase in annual man-hour employment. This is something less than the anticipated increase in population of 1.8 per cent per annum. Hence, any increase in output on this score would be insufficient to maintain per capita incomes at their present high levels. It is, of course, possible that if our standard of living were to decline, we would all endeavor to work harder and longer. But in the future we may expect to see a continuation of past trends. As education becomes more widespread, more students will go to college. This is a capital investment, but nevertheless it keeps young people out of the work force a few years longer. The number of old people will also continue to increase as medical science lengthens the life span. Furthermore, earlier retirement is fostered as incomes increase and the desire for leisure becomes relatively greater than the desire for income. We may thus safely predict that if the number of hours devoted to work changes at all, the change will be toward either a shorter work week or a shorter working day. It appears then that there will be no great increase in effort in the years ahead. In fact, if past trends continue, it is more likely that effort put forth will decrease as effectiveness increases. We are all familiar with the historic example of the worker with a pick and shovel versus the worker with the steam shovel. Few would assert that the worker equipped with

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a steam shovel puts forth the same amount of effort as his counterpart of former years.

Increases in our Gross National Product, therefore, have to stem primarily from improvements in the effectiveness with which we work. This simply amounts to saying that productivity will have to increase.

Productivity — the Concept

Productivity, in the literature of economics, is usually defined as output per unit of input. This sounds simple enough, but it is one of the most debatable concepts in economics.

The measurement of productivity alone opens a Pandora's box. For example, the determination of *output* is difficult enough when dissimilar items have to be equated. This is achieved through the medium of money serving as a unit of account—a common denominator—with all items converted to the common denominator before measurements of output are made. Even greater problems arise in the measurements of *input*. Which of the factors of production — land, labor, or capital—should be used? As a general rule we may say that productivity should be measured in terms of the most scarce factor, since this is the factor whose use is to be conserved. Thus, in India, it would be capital; in Holland, land; in the United States, labor. But even when labor is decided upon, there is still the problem of whether to use the number of hours worked or the number of hours paid for. As vacations with pay increase, and more companies allow sick leave, disparities between these two concepts of labor input become wider.

It is not the purpose of this article to detail the arguments relative to the measurement of productivity. It is important to note, however, that although productivity is defined as output per man hour, no casual relationship of necessity exists between increases in output and the effort (or exertions) of workers. For instance, productivity in the steel industry and in industries using steel declined in the third quarter of 1959. This had nothing to do with the workers' efforts as such, but stemmed from material shortages and cut backs in production. By the same token, increases in output per man-hour that may be safely predicted in these industries for this year will not stem from increased effort by the workers, but from a return to capacity operations, and from technological improvements.

Productivity Analysis

If the effort put forth by labor is not the source of increases in productivity, what then are the factors behind productivity gains? The causes behind increases in output-per-man-hour are complex and interdependent but it is possible to identify the main ones. For expository purposes it is useful to consider them under two headings: cultural and economic.

Cultural. The United States has been blessed with a stable social and political environment based on constitutional government and the rule of law that has given maximum freedom to individuals to pursue their own ends. We have enjoyed an economic system based on the free market with the positive incentive of *profit* for successful enterprises and *loss* as a destroyer of those that do not warrant society's support. We have been more willing than other countries to accept competition as the disciplinary force in the market place so that rivalry between individuals for capital, sales, labor, and raw materials has led to the utilization of resources in productive areas. Our business management has traditionally been willing to seize opportunities to develop new machinery, introduce new products, reduce costs, and maintain a receptive attitude to new ideas. The labor force has been relatively healthy, has possessed a mechanical aptitude, and has inherited the Puritan devotion to hard work. In no other country in the world, is education diffused through so much of the population. We have the technical education that makes it possible for our workers to acquire the skills needed in the modern technological society and, in addition, we offer general education to develop the receptiveness of mind to new techniques and new products and to weaken the force of tradition and custom. Our labor force traditionally in the past has been extremely mobile. Mobility can be viewed in two senses. On the one hand, we have *horizontal* mobility — mobility between jobs, between geographical localities, and between occupations. We think nothing of a university professor who quits teaching to become a vice-president of an automobile company. In Japan, such a shift of allegiance would be unthinkable. Mobility can also be considered in a second sense as freedom from economic and social class — *vertical* mobility. In this respect, it is doubtful whether any other country in the world offers the freedom to advance through the social and income strata that is offered in America. Finally, among the cultural factors, we may note the importance of science and invention. While Europe has been the traditional home of pure scientific research, there is no doubt that the North American continent, and particularly the United States, has been the leader in applied science. These technological improvements have had the effect of increasing the productivity of capital and labor. Furthermore, they have often acted as a spur to consumption. For example, the development of electricity, automobiles, airplanes, television, nylon, rayon, aluminum, plastics, and electronics has created desires that were unknown in the past. And the fulfillment of these desires has kept our economy clipping along at a fast pace.

Economic. Of the economic factors, undoubtedly the most important is the amount of capital invested. Cultural factors are imporant primarily in terms of the effect they have on sustaining the flow of venture capital. The importance of the increase in the amount of capital in improving the effectiveness of the worker may be seen by noting that net investment in structures, equipment, and inventories in manufacturing is now about $9,000 for each manufacturing employee. There has also been substantial investment in capital equipment in mining, agriculture, construction, distribution, office work, and some professional activities. Furthermore, public capital has increased tremendously in the past fifty years through investments in highways, harbors, waterworks, schools, parks, and hospitals. All of these things have served to increase output-per-man-hour. Capital invested in transportation and communication has resulted in timesavers, permitting more work to be done in the same time. We need only note in transportation the importance of railroads, steamships, aircraft, automobiles, and trucks in moving men and goods faster and in more volume. In communications, the use of the telegraph, telephone. electronic computers, and systems improvements has made speedy economic decisions possible and has multiplied the volume of business that can be transacted.

Future Productivity

Which of these effects will be important in the future? This may be summarized by noting that productivity may in general be increased in two ways:

1. It may be increased by a shift from lower to higher productive activities. In this respect capital may move to more productive areas or labor may move to more productive areas. We had examples of this in the trek west of farmers in early years and the subsequent move of labor from farms to industry and the shift of southern workers to the industrial north. But mobility is perhaps less now than it was in the past. For one thing, there are not many farmers left on the farms. Of greater consequence is the fact that industrial pension funds, unemployment insurance, and home ownership have led to workers becoming more established in their communities so that they are more reluctant to pack up and shift to another geographic area.

2. Productivity may also be increased by shifts within industry. Historically, these shifts have taken the form of either the replacement of labor by capital, or the replacement of capital by more efficient capital. If the capital is the same type as before, output increases and so does output-per-man-hour, but productivity of capital does not increase. Thus the need is emphasized for continued expenditure on research and development so that the productivity of both capital and labor will increase as capital investment increases.

This brief look at productivity may be summarized by saying that the high productivity of the U. S. worker (and it is the highest in the world) has had relatively little to do with the workers themselves. It has, in fact, been attributable more to the supply of other factors with which labor is combined. Some years ago, Fred M. Taylor, the great economist of the University of Michigan, used to imprint this principle on the minds of his students in the following epigram: "The value of any one factor of production depends upon the supply of all the other factors of production." Thus the productivity of labor depends on the circumstances in which labor is placed. U. S. labor has been fortunate in working in a political, economic, and spiritual climate which has been conducive to the spirit of enterprise and which has elicited an abundant supply of venture capital. This has been the main factor underlying the productivity of the worker and will continue to be so in the future.

The supply of venture capital depends on the past and prospective rate of return on capital invested. This yield, in turn, is dependent on the effectiveness with which management has used funds invested in the past, since these provide the funds for future expansion, and realized profits have a bearing on profits in prospect. It is important, therefore, to understand the relationship between capital investment and the rate of return on capital. If there is no technological improvement, continued capital investment will force the rate of return on capital down. There is presumably some minimum rate of return needed to cover the risks involved and the opportunities foregone. When this is reached, investment will cease. If there is technological improvement concurrent with the investment of capital, the rate of return on capital can be sustained even though investment increases. As a third possibility, it is more likely that capital improvements and capital investment will take place concurrently. This appears to have been so in the past. According to one estimate, 13 per cent of the gain in output between 1909 and 1940 came from more capital and 87 per cent of the gain resulted from technological improvement.

Rates of Return, Turnover, Revenues, and Costs

Figure No. 1 shows annual rates of return on average stock equity for all corporations filing tax returns with balance sheets attached between 1926 and 1955.

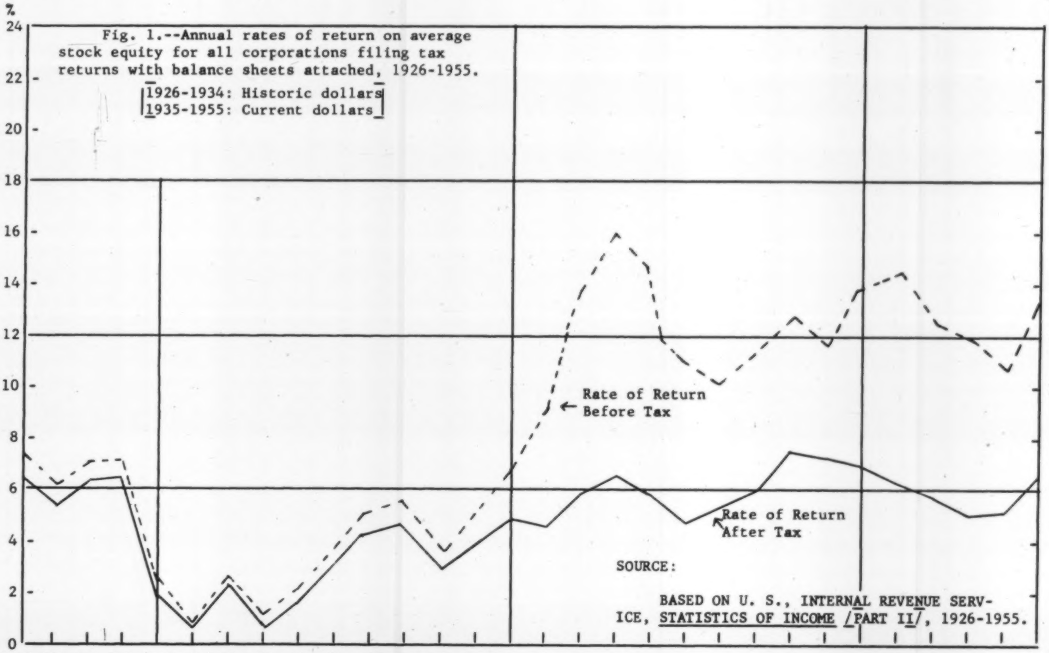

Fig. 1.--Annual rates of return on average stock equity for all corporations filing tax returns with balance sheets attached, 1926-1955.

[1926-1934: Historic dollars]
[1935-1955: Current dollars]

SOURCE:

BASED ON U. S., INTERNAL REVENUE SERVICE, STATISTICS OF INCOME /PART II/, 1926-1955.

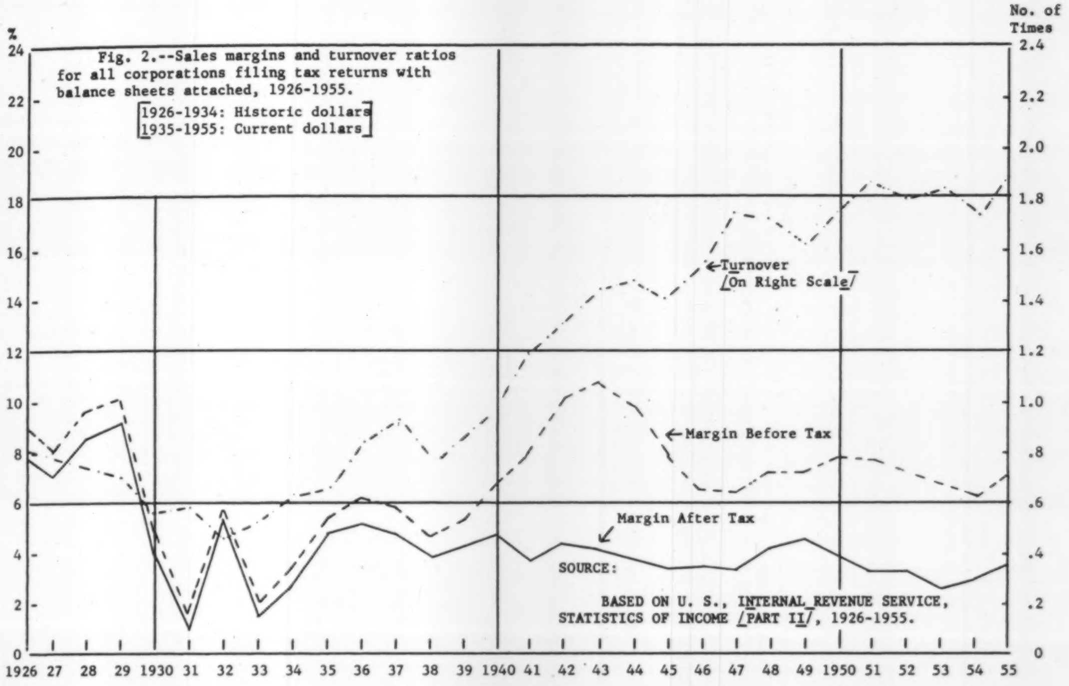

Fig. 2.--Sales margins and turnover ratios for all corporations filing tax returns with balance sheets attached, 1926-1955.

[1926-1934: Historic dollars]
[1935-1955: Current dollars]

SOURCE:

BASED ON U. S., INTERNAL REVENUE SERVICE, STATISTICS OF INCOME /PART II/, 1926-1955.

The data have been adjusted for the impact of inflation between 1935 and 1955; between 1926 and 1934 the data are shown on the basis of historic dollars. The years between 1930 and 1950 may be ignored because of the obvious impact of the great depression, the Second World War, and the Korean War. However, 1926 to 1929 offers a useful comparison with 1951 to 1955. In the earlier of the two periods, the average rate of return was 6.07 per cent; in the later, 5.67 per cent. In view of the tremendous investment of capital relative to labor between these periods, it is clear that technological improvement has been a tremendous force at work sustaining the flow of capital at a rate of return sufficient to compensate for the risks involved.

This can be seen when we look at turnover of capital, which is shown in Figure No. 2. Between 1926 and 1929, every dollar of capital investment generated about 75 cents of sales. On the other hand, between 1951 and 1955, every dollar of capital investment generated sales amounting to $1.83. This increase in turnover reflects productivity gains or, to put it another way, it reflects the decline in the ratio of capital to output. This is to be expected. But, as turnover increases, the rate of return would increase if net income per dollar of sales were to remain constant. Assuming no change in risks, investors would add to their investment as the profitability of capital increased. In the long run, prices would be forced down, payments to factors would go up, or excessive capacity would be generated. It is of little consequence for this discussion which of these would occur. The important thing is that margins would be narrowed.

The facts support this hypothesis. Figure No. 2, Sales Margins and Turnover Ratios, reveals that between 1926 and 1929 average margins after tax were 8.59 per cent. Between 1951 and 1955, however, margins after adjustment for inflation averaged only 3.2 per cent. Thus, margins, or net income per dollar of sales, were over 150 per cent greater in the second half of the 1920's than they were in the first half of the 1950's.

(Continued, November Issue) **s/p/a**

Operations Research: A Keystone

Maurice F. Ronayne

▶ Can Operations Research become a useful tool of management? Or should it be left in the hands of its creators—mathematicians and scientific researchers? This article reviews some attitudes about Operations Research as a tool of management. It identifies it as a management science with a future.

Developed by the English and later accepted enthusiastically by Americans during World War II, Operations Research brought top researchers together for the expressed purpose of pooling mathematical and scientific knowledge toward solving military problems. Problems met successfully ranged from the correct placing of "GI" washtubs for cleaning messkits and expediting long lines, to the determination of the optimum number of armed escorts needed for ship convoys without having too little or too much protection against hostile submarines.

Since the close of the war, much has been written about Operations Research. As might be expected, some large business firms set up their own OR staffs, but these are in the minority. An example of the type of problems studied is General Electric's OR study of the making of bids on defense contracts to determine beforehand if it is worthwhile to begin the preliminary and rather costly research required to submit a bid.

Most companies prefer to have their mathematicians and scientists concentrate on product research and development problems. Management problems are generally studied and analyzed by industrial engineers and systems procedures analysts. Marriages between science and management are uncommon, especially among small firms possessing minimum resources. However the lack of financial and physical capacities usually associated with OR is not the principal deterrent to a more widespread development of Operations Research staffs. A real obstacle is the conservative attitude of many management people. They prefer "to play it

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safe" with tried and true methods rather than to take a chance with OR. Unfortunately, some organizations still think in terms of airplane days instead of missile-rocket ones.

A common fault of the management man in relation to Operations Research is his general misunderstanding of it. Some connect it with military work primarily. Some, although they have read about OR and attended courses or lectures dealing lightly with it, categorize it as being too scientifically oriented to be immediately useful in solving management-type problems. A few look upon it as the panacea for all of management's ills although once they learn that it is not a "wonder tool" which can be applied easily, they may make an about face and thereafter condemn everything associated with it. Only a small number recognize OR for what it is — a valuable supplement to the tools of good management.

Some Definitions

One text defines OR as:

". . . the application of scientific methods, techniques, and tools to problems involving the operations of a system so as to provide those in control of the system with optimum solutions to the problems."[1]

Another definition appears in a brochure of the U.S. Civil Service Commission, used to recruit Operations Researchers:

"Operations Research (or Operations Analysis) is an advisory function based on the application of the methods of science to the solution of operational problems in complex organizations. The objective is to provide quantitative bases for executive decisions which will result in improved operations. The problems are those of management, and the approach of their solution is related to the overall objectives of the organization rather than to the objectives of a particular part of the organization. Operations Research assists management in arriving at decisions affecting all echelons of an enterprise, whether these decisions are of a technological, tactical, or strategic nature."[2]

Management Science

Some management groups believe it desirable to divorce OR from its military heritage and call it by a different name when it applies to problems of business administration. Following this viewpoint, the U.S. Navy Management Office refers to its OR activities as *Management Science*.

Management Science is the use of the mathematical sciences (mathematics, mathematical economics, and mathematical statistics) to identify *all* significant factors in a complex management problem leading to the "best possible" solution of that problem. Some of the skills of the Management Sciences were used in World War II to establish optima patterns of bombing, track down enemy submarines, and evaluate weapons systems. But Management Science, unlike "Operations Research" in World War II, deals with management, administrative, and personnel questions, and not with problems essentially involving only physical factors.[3]

In this new prospective, perhaps management can recognize more readily the application of OR or Management Science to everyday administrative problems. Precisely defined, the application of OR or Management Science to administrative management is:

A research technique which, by the application of scientific method to the analysis of facts or complex situations in the most varied fields of economic, social, or administrative life enables the heads of an enterprise, or of a public or private body, to resort as little as possible to empirical methods in arriving at their decisions and to base themselves to the utmost on reality.[4]

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[1] C. W. Churchman, R. L. Ackoff, and E. L. Arnoff, editors, *Introduction to Operations Research*, (New York: John Wiley & Sons, Inc., 1957) pp. 655.

[2] *Operations Research Analyst*, Announcement No. 193B, Washington, D. C., April 21, 1959, p. 1 of 6 pp.

[3] "Tomorrow's Management," *Navy Management Review*, June, 1959, pp. 4:2.

These definitions are clear and precise. They do not identify tools which are too formidable for the progressive manager who does his homework and keeps up with the latest developments in business administration. This type of manager will recognize OR as a way of obtaining further grist for his electronic data processing mill.

Business Problems

Even so, some oppose the application of OR techniques to administrative management. They maintain that business or industrial problems are elementary when compared to scientific ones and that OR is really not needed; that it is an unecessary complication or sophistication. If one approaches the initial phase of a business problem in the traditional way, this may be so. But those who have worked with identifying alternative courses of action when putting "simple," business-type problems on EDPS find that they are more difficult and complex than scientific ones. In fact, a major roadblock in the objective treatment of business management problems today is the correct definition of problem parameters. Business-type problems are not generally expressed in the tight specific formulae of science nor in all probability do they need to be, but through OR, it is possible to identify a problem more concretely and to put it into a form that an electronic computer can digest, thus developing "solutions" which recognize alternatives.

William Bell develops this viewpoint to some degree in his book *A Management Guide to Electronic Computers.*

". . . The fact is that business applications are undoubtedly more difficult to handle than are technical calculations. This is true because the technical calculation is usually established in terms of formulas — the programmer knows what is to be done and how it is done. In the business application, the first and the most difficult problem is the determination of what exactly is to be done. These problems are complicated by the difficulties of dealing with the many departments, groups, and sections which must be considered in a particular application and by questions of company policy and legal requirements."[5]

Automatic Programming

The development of automatic or machine programming should help to make business problems easier to handle. Computer manufacturers are already marketing automatic coding systems, most of which use English language instructions according to the decision of the UNESCO sponsored International Conference on Information Processing (Paris, June 1959) to use English as the international programming code language. With automatic coding progressing, perhaps the day of automatic programming is not far away.

Automatic programming promises better utilization of present EDPS hardware. It offers:

(1) A library of knowledge, and an accumulation of information that will enable the machine to do perhaps 90 per cent of the work of making instructions for its own operations; and,

(2) A system of logic that will allow the machine to decide the best of several ways in which it might go about solving a problem.[6]

The following excerpt from a story of an application of a Canadian management consulting firm helps to illustrate these "promises":

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[4] "Applications sociales de la recherche operationnelle," *Science et Societe, Impact* (UNESCO) No. 2 (IV), 1953.

[5] New York: McGraw Hill Book Co., Inc., 1957, p. 183.

[6] "Educating the Big Computers," *Business Week,* No. 1554:74, June 13, 1959.

". . . a large client came to the company one Friday and asked whether it could get help in estimating the effects on its business if it was successful in securing a very big contract. Normally, the estimating of such a job would take weeks, but the KCS experts quickly set up equations which contained all the mathematical facts in the problem, ran them through the computer and came up with a detailed answer Saturday morning. This enabled the company to make a highly accurate bid for the contract."[7]

The Future

The conscientious, well-trained manager of 1970 will not need to try to solve a problem from a mainly subjective viewpoint, relying on his judgment, experience, and catch-as-catch-can facts. Operations Research backed up by computers will simplify the solution of his problems by supplying him with better and more accurate facts faster than was ever thought possible.

How primitive and uncertain present decision-making patterns will seem then. This is recognized even today as pointed out by Dr. Lowell H. Hattery of American University who says:

"Analysis of decision-making shows that most executive decisions are made with the benefit of limited, late, and often irrelevant data. Decisions are based on experience, impressions or trends, advice of others, etc. We now have a machine which can provide up-to-date analyzed relevant data. If the executive is prepared to use them as warranted in his decision-making, he will be strengthened."[8]

Few executives will have to tackle complex problems alone. Within the next ten years, many universities will be graduating men trained in using Management Science tools. No longer will the practitioners of OR in business be mainly transplated mathematicians or scientists. They will be men trained to use the tools effectively for management. By 1970 a Department of Management Science or Operations Research should be a part of the curricula of many major universities.

Earlier, advances in coding computer programs were described. Management scientists or operations research analysts will be able to make up the most complex problems and put them on the computer. Automatic programming, when it arrives, will facilitate the maximum use of computers by staff analysts. Robert M. Smith, editor of *Office Management,* envisions even greater computer responsibilities. He says that the computer:

". . . would be a clearing house foı information, and would also, according to prescribed principles already laid down by management, make many of the operating decisions now made by intermediate management, and, in some instances management."[9]

Two university professors, Harold J. Leavitt and Thomas L. Whisler, in an imaginative and provocative article in the *Harvard Business Review,* tried to picture the role of management in 1980. They predicted that management will be a highly structured corps, with less opportunity for advancement from apprentice to executive; top management will be evaluated by its peers, and perhaps most important, diminish the size, power, and responsibility of middle management to the point where it almost disappears — replaced by Management Science. To prepare for this new era Messrs. Leavitt and Whisler advise 1960 managers to carry out these steps:

"(1) . . . locate and work up closer liaison with appropriate research organizations, academic and otherwise, just as many companies have profited from similar relationships in connection with the physical sciences.

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[7] Franklin A. Russell, "Company the Computer Built," *Executive Decision,* (Don Mills, Ontario, Canada) August 1959, pp. 1:28.

[8] U.S. Congress, Committee on Post Office and Civil Service, Subcommittee on Census and Government Statistics, Hearings, *Use of Electronic Data Processing Equipment,* Washington, D. C., June 5, 1959, p. 133.

[9] Robert M. Smith, "Why New Coding Techniques May Accelerate Pace of Office Automation," *Office Management.* October 1958, pp. 19:88.

"(2) . . . re-examine their own organizations for lost information technologists. Many companies undoubtedly have such people, but not all of the top executives seem to know it.

"(3) . . . make an early study and reassessment of some of the organizationally fuzzy groups in the companies. Operations research departments, department of organization, statistical analysis sections, perhaps even personnel departments, and other 'oddball' staff groups often contain people whose knowledge and ideas in this realm have not been recognized. Such people provide a potential nucleus for serious major efforts to plan for the inroads of information technology."[10]

The Challenge

It will not be easy for many members of management to "reverse" direction. Human ego is strong. Many managers pride themselves on a sixth sense—intuition and psychic powers—an ability to make decisions with few or no facts. When executives associate success with subjective approaches, it is almost impossible to convince them that more complex methods should be attempted. G. Clark Thompson describes, in a National Industrial Conference Board survey on EDPS in American private industry, this ingrained human foible of opposing change:

"The real electronic data revolution, if there is one, will not be in the mere extension of office automation, but in the revision of management methods . . . When large numbers of mature people are bound together in a successful business enterprise their collective resistance to change is not only frustrating but at times appalling. And therein lies the challenge to any management that hopes to realize the ultimate promises of electronic data processing."[11]

This challenge has to be met. Every day, more information is available to managers on which to base rational—not intuitive—decisions. "Knowledge is power," and knowledge comes from having the facts at hand. Operations Research is, therefore, an important new tool in the workbox of management. Andre Molitor, Director-General in the Belgian Ministry of Education and well-known European writer on management points out that OR can ". . . ensure that when a concrete problem arises it is resolved, not on the basis of empirical and subjective data, but as the result of a study of rational and objective facts, as far as possible scientifically established."[12]

OR supported with EDPS can help to resolve objectively the most difficult problems. Another writer sums up the advantage of these new techniques as "Sharper decision-making through ability to consider more alternatives and analyze more complicated relationships."[13] OR identifies the alternatives, and EDPS enables OR to analyze the relationships.

Administrators, executives, and managers in private and public organizations, working together and using fully the new tools of management sciences, can make the next decade into ten fruitful years. Men of management can produce results which will make Professor Toynbee's words rings with prophetic significance:

"This twentieth century will be remembered as the era when the benefits of civilization will become available to the whole human race."[14] **s/p/a**

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[10] Harold J. Leavitt and Thomas L. Whisler, "Management in the 1980's," *Harvard Business Review*, November-December, 1958, pp. 36:41.

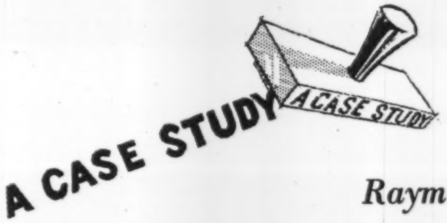
[11] *Management's Role in Electronic Data Processing*, Conference Board Reports, Studies In Business Policy, No. 92, National Industrial Conference Board, Inc., NYC, New York, 1959, p. 4.

[12] Andre Molitor, "Operational Research Applied To Administration," *O & M Bulletin*, London, United Kingdom, April, 1956, pp. 11:3.

[13] Harold Kootz, "Top Management Takes A Second Look At Electronic Data Processing," *Business Horizons*, Indiana University, Spring, 1959, pp. 2:75.

[14] Arnold J. Toynbee, *New York Times Magazine*, December 2, 1951.

The Significance of Non-Significant Part Numbers



Raymond P. Gauer

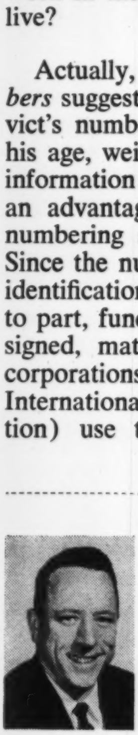
▶ Have you struggled at any time with a significant part-numbering system? This article presents a good case for using the convict or straight sequential numbering system instead. It attempts to remind you of the advantages the one system has over the other.

* * * * *

Ask almost any engineer, or production man to design a part-numbering system for a manufacturing concern and the chances are he will come up with a *significant* system of some type. A significant number is one which attempts to describe the part as well as identify it. Significant numbering systems would appear to be logical, and although they can become long and cumbersome it seems just good common sense to be able to look at a part number and tell "something" about the part. "Something" is in quotes because the something various departments in a manufacturing and selling operation would like to have the part number tell them depends on the needs of the particular department. To satisfy *all* of the "legitimate" requirements of the various groups thus affected in, for example, our Corporation would take a conglomeration of many alphabetic and numeric characters, too long to be practical.

By contrast, straight sequential, non-significant numbers are often frowned on as being un-sophisticated or un-scientific. Some go so far as to call them convict numbers. The idea of using a straight sequential numbering system is, in fact, so simple that few articles have been written about it. What can one say? Number the parts consecutively from 1 up! Can anything that simple work in the modern space age in which we live?

Actually, however, the term *convict numbers* suggests a rather good analogy! A convict's number does not tell anything about his age, weight, or offense. If you want this information you look it up. And herein lies an advantage. Users of straight sequential numbering systems *look it up to be sure*. Since the number merely provides reference identification, no one tries to interpret it as to part, function, cost, size, model, year designed, material, etc. Some of the largest corporations in the world, (General Motors, International Harvester, Chrysler Corporation) use the straight numbering system.



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Many others are converting to it because of its general advantages.

Sequential Numbers

Straight numbers can provide positive identification with the shortest possible number. This advantage is important when you consider the number of times identification numbers are written each day by personnel throughout a corporation: in purchase orders, sales orders, production orders, inventory records, accounting records, labor records, tooling records, engineering records, etc. In terms of writing time alone, a 5-digit number is 28 per cent shorter than an 8-digit number. Many users of significant systems insert alphabetic characters in the part number in order to shorten the number or provide for a greater classification range within each significant field. But, alphabetic characters complicate handling; they are difficult to communicate orally. When written by hand, they can easily be mistaken for numbers unless written very carefully.

Straight numbering systems never run out of numbers! This factor of numeric continuation is important because significant systems frequently require revision to provide additional significance or to increase the range of specific significant sections. These changes, although sometimes blamed on the deficiencies of the specific system, are inherent deficiencies or limitations of signicant systems as such. Changes of this sort create confusion. The trend toward product diversification makes it virtually impossible to devise a significant number that will be flexible enough to encompass future requirements and expansions. So, why try when a straight number system is so much simpler and can satisfy all requirements?

Storage Locations

Some companies build a storage location identification into the significant part-number system to assist in warehousing operations. This can be in the form of a "Category code" so that all like parts will be stored together, although the practicality of this is to be questioned. Any good warehouseman knows that space is usually at a premium. Parts are most efficiently stored on the basis of item, size, quantity, and usage and this type of identification is not a function of a part number. Many warehouse indexing techniques eliminate the need to burden the part number with such information. When all varities of a like part are stored in the same area, the "parts picker" will probably get to the right area but he may still carelessly pick the wrong part. Forcing reference to the specific part number called out eliminates parts-picking errors.

Sorting

Prior to modern data-processing techniques, it was necessary to attach significance to part numbers to facilitate sorting the parts into certain basic categories. Today, however, most companies employ some data processing technique such as "key sort" cards, conventional punched cards, or electronic computers. These techniques make it easier to sort parts into almost any sequence. For example, by standardizing nomenclature (which should be done no matter what type of part-numbering system is used) and by starting each name with a meaningful noun, part descriptions can easily be sorted alphabetically. Such a sorting need only be performed once as a reproduced deck of alphabetically sorted cards can be maintained separately and listings prepared from it as often as necessary. Numeric cross references can also be maintained on punched cards for numeric listings and can show such additional information as next assembly, top assembly, procurement code, bill of material reference, inventory code, and issue quantity, including reference to the engineering order which released or obsoleted the part. These alphabetic and numeric listings can be obtained almost "free" as they are by-products of a mechanized bill of material which is a natural punched card or computer application.

An Example

So much for the general advantages of straight numbering systems. Perhaps you would like to know how such a system actually works. At McCulloch Corporation we recently adopted throughout the corporation, a straight-numeric, non-significant numbering system used by our Los Angeles plant for many years. We manufacture chain saws, target engines, brush cutters, post hole diggers, and other related accessories at our Los Angeles plant, and outboard motors at our Minneapolis plant. These products are sold and serviced throughout the United States, Canada, and other countries of the world. Our numbers range from 00001 thru 999999 with the following assignment:

00001—69999 —Los Angeles—Parts Peculiar[1]

70000—99999 —Minneapolis—Parts Peculiar

100000—199999—Standard Parts[1] (hardware items)

200000—999999—Reserved for future assignment

Parts Peculiar numbers are assigned sequentially at each engineering group; Standard Parts are assigned by a central engineering standards group at the Los Angeles plant. It must be admitted that even our system has a slight degree of significance as the originating engineering group can be determined by the part number; all Standard Parts have numbers in the one hundred thousand series. Such incidental "significance" is helpful but is not featured.

Identification of Changes

"Parts Peculiar" changes are identified as follows: If a part is changed in a way that has no effect on interchangeability, a dash number is assigned to the drawing (12345 becomes 12345-1.) However, dash numbers do not become an integral part of the basic identifying number. They are used for internal manufacturing convenience only. They do not appear in service catalogs or on sales orders or price lists. Dash-number changes are indicated in the revision block on the drawing and a request from any source for a print of part number 12345 would result in the issuance of a print labeled 12345 which would also reflect the last dash-number revision assigned at that time.

If a part is changed in such a way that the new part can be used wherever the old part was used, but the usage of the old part is restricted, a letter is assigned, and becomes an integral part of the number (12345 becomes 12345A). We will then no longer manufacture or stock part 12345 at the plant, and its drawings and other related records are obsoleted. In effect, 12345A is an entirely new and different number. The next such change would be B (12345B) and would indicate that the B part can be used wherever the A part or the plain number had previously been used, but the old parts must not be used where the B part is specified. Only the letters A through H are used in this way so that they can be sorted as a numeric field on our tabulating equipment. The letter I is not used to avoid confusion with the number one. When a change is made in a part which is already identified by a number ending in H, a complete new number in the current series is assigned. If a part is redesigned in such a way that the new part *cannot* be used wherever the old part was used, it is assigned an entirely new number in the current sequence.

Conclusion

A straight sequential numbering system is simple yet it provides the advantages of the so-called significant numbering system while it avoids its pitfalls. This simplicity is important when one considers the number of people who are affected by part numbers in a manufacturing concern as well as in its vast distribution and servicing network.

Designing part-numbering systems has almost traditionally been a function of the engineering department which originally designed and released the parts. However, it is important to realize that once a part number is released, the engineering department has less to do with its processing than most other corporate functions. Thus the design of a part-numbering system is a logical assignment for a systems man. It is a good way to exert a little "systems" influence on a problem that has plagued many companies for years. **s/p/a**

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[1] "Parts Peculiar" are proprietary designed parts and "Standard Parts" are items that may be purchased as catalog items from two or more recognized vendors.

Your Records Management Program

Action in a Record Management Program saves space, time, energy, and money

John H. VanNest

▶ Save *space, time, energy,* and *money* through a complete and workable program of records management. Save *space* through an efficient utilization of available office and storage areas; save *time* in preparation, distribution, and utilization of records; save *energy* by planning work stations and storage areas so that records are as near as possible to the agency using them; save *money* through a planned program of retention of current records, storage of non-current and vital records, and destruction of useless records. This article discusses ways of doing all four.

Planning a records management program is a continuous process. In its full scope it involves:

1. Planning
2. Inventory
3. Analysis or evaluation
4. Negotiation
5. Personnel indoctrination
6. Storage
7. Maintenance
8. Value assessment

Records which might fall within a records management program are:

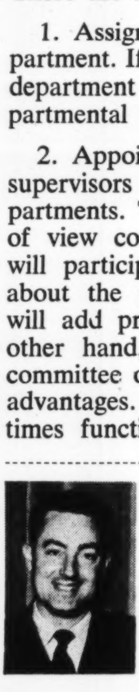
1. Sales
2. Purchasing
3. Cost accounting
4. Bookkeeping
5. Production
6. Personnel
7. Management reports
8. Correspondence
9. Blueprints
10. Legal

Responsibility

Before a records management program is initiated, we must decide who or what department is going to be responsible for it. There are several possibilities:

1. Assign the program to a specific department. If this is done, coordination across department lines may cause friction and departmental jealousy to develop.

2. Appoint a committee composed of key supervisors and managers from different departments. They will have first-hand points of view concerning records problems and will participate in and share deliberations about the problems. Also, their presence will add prestige to the program. On the other hand, the disadvantage of using a committee organization may outweigh these advantages. Committee programs many times function in theory but not in fact.



Major John H. VanNest is a regular officer with sixteen years active service in the United States Air Force. Interested in administration problems of all types, he wrote this article while taking continuation studies last spring in the School of Business Administration, University of Michigan, Ann Arbor.

Members meet infrequently due to other assigned duties. Getting *yes* or *no* answers from a committee takes time and committee members are not willing to apply pressure to get results. Records management programs, under committee supervision, are not strict enough to obtain best results.

3. Hire an outside records management consultant. If this is done, the organization must consider previous experience with consultants and their availability. If time is an important factor and trained personnel are not available, then the answer may be to employ a consultant. Money may also be a consideration in deciding on the use of a consultant. Another point overlooked when the consultant is employed is the possibility of having someone in the organization trained by the consultant to carry on the program as a continuing effort, since a records management program will not run itself after the consultant is gone.

However the responsibility for a records management program is determined, the essential steps for success are (1) appoint a records' manager; (2) identify goals and obtain and retain the support and understanding of management, including line supervisors; and (3) prepare a tentative outline and time schedule of the program. A program cannot achieve its objectives without management support. Let it be known that the program is supported at the top levels. Other familiar obstacles are: habit, disagreement, lack of coordination, company fear (protection files), improperly designed forms that require several records to be filed instead of one complete record, and, last but not least, individual convenience files of our friend "squirrely" who must keep a copy of all his fine work.

With a records manager appointed and supported, we must next set up a *time schedule* and a *plan* to implement the program. The program operation sequence could be in eight phases:

1. Planning—involves a program that includes the entire life span of records from their creation to destruction; through management, line supervisors, and clerical employees.
2. Inventory—is a physical listing, counting, and classifying of records in homogeneous groups.
3. Analysis or evaluation—is collating all data on each record group and preparing a preliminary records retention schedule.
4. Negotiation—is securing from management and department heads, approvals of the proposed records retention schedule.
5. Personnel indoctrination—is important during the time the program is being initiated and implemented. Prepare manuals for standardizing procedures.
6. Storage—involves arranging inexpensive storage facilities for inactive records.
7. Maintenance—involves monitoring the flow of records from office to storage to destruction.
8. Value assessment — is evaluating the success of the program periodically and comparing the results with the standards and goals. This step is important to the continued good health of a records management program.

Let's explore these phases, assuming that no records program exists at the beginning.

Phase I: Planning

Successful records management programs are carefully preplanned, based on a thorough analysis of organizational needs. If the plan is to be successful, it must include the intelligent and willing support and participation of management, line supervisors, and operative employees. Planning the program is vitally important to the attainment of objectives. A records management plan should include: defining the objectives (both short and long-term) and the purposes of the program; surveying the qualifications of personnel available to implement and operate the program, and of equipment and space available; determining the phases and implementation timing of the program; assigning the program phases to the personnel involved; and attempting at all times to standardize methods and procedures for completing the program.

Phase II: Inventory

Making a records inventory is a tiresome, boring, sometimes dirty job, but is the basis for establishing a sound records management program. It is best made according to a standard plan formulated by the records manager and implemented by each department since each department best knows what records it has and how they are related and used. The basic unit of an inventory is the functional group, a unit of records that can be distinguished by title from all other groups within each department. The title, then, is important and care should be exercised in its selection. Other data that can be recorded during the inventory are as follows:

1. Dates — oldest and newest piece of paper in each group and large time gaps that exist.
2. Form numbers—if any, and indentification as either a company or miscellaneous department form.
3. Method of preparation—typewritten, pen, or pencil.
4. Original or duplicate—if duplicate, location of the original.
5. Rate of reference—*requests for material*—the amount of use, by department, which the record receives. A reference of 20 per cent or more is usually considered active. Records used less than 5 per cent are inactive and possibly should be in dead storage.
6. Type of indexing system used: alphabetic, date, subject, numeric, other.
7. Value as to historical or vital record significance.

Some record groups such as numbered payroll checks or forms in numbered sequence will be easy to inventory. Harder groups to index are subject and general files. Personnel originally responsible for filing the records may have left the firm or be unknown so that suprisingly worthless (or valuable) records are uncovered.

Inventories are usually taken by one or two specially qualified persons or by personnel from the departments involved. If the latter procedure is used, there must be a preliminary meeting of department representatives for the purpose of explaining the exact procedures to be followed and the information needed. Ground rules and a time schedule for completion must be set forth in advance.

Phase III: Analysis and Evaluation

The records manager must sit down with members of the legal department, comptroller, and/or systems and procedures officer to develop a preliminary records retention schedule. Analysis and evaluation of each record group must consider legal, financial, and historical value of the records. Two well-known indexes are published which help decide which records should be retained and for how long.

1. Federal Register, which is brought up to date annually by the National Archives and Records Service, Washington 25, D. C.
2. Index of Federal Records Keeping Requirements, published by the National Records Management Council.

Both contain state record statutes of limitations and record requirements under state tax laws.

Other Organizations. It is a good practice to look at what other organizations and firms with similar jobs are doing. Their experiences may help in analysis and evaluation. Care should be exercised here, however, since two organizations are never exactly alike. Some organizations, especially in city government, are tied to a bewildering variety of state and local regulations. Yet much can be learned from experiences of others, and this possible source of information should not be overlooked.

Phase IV: Negotiation

The Records Retention[1] Schedule will control the flow of records from office to storage. Each record group is evaluated for operating necessity to determine just how long it should be retained. Legal and financial requirements are determined and decisions are made as to whether a record has historical value or is vital to continued operations.

Vital record selection and protection require careful planning. If disaster strikes, what records will be needed to establish operations again? Two possibilities exist:

1. Protect the original records in a fire proof and burglar proof vault or safe.
2. Protect a duplicate set of records by one of the following methods:
    a. Designate an already dispersed copy as a disaster copy.
    b. File an already existing duplicate copy at some other location, removed from the original.
    c. Make a duplicate and disperse it. This can be done by microfilming or contact printing. Care should be exercised in selecting what method of duplication is used since each has legal, size, and cost limitations.

Phase V: Personnel Indoctrination

Personnel indoctrination includes cooperation and coordination of the program involving management, the records manager, line supervisors, and the operational levels. Unfortunately, each phase of the program, from planning to an assessment of the results, depends considerably on the human factor. Everyone involved in a records management program must be briefed on what must be accomplished, how it is to be accomplished, and when it is to be completed. In achieving this aim, consideration should be given to the preparation of a manual. It should include the purpose of the records management program, goals of the program, phases of the program, and methods for the accomplishment of each phase. Manuals improve results through better personnel training and standardization of procedures and equipment.

Phase VI: Storage

The practice of storing records in well-designed records centers has increased tremendously in the past 10 to 15 years. The reason for this increase is primarily the low operating cost of records centers. They provide more intensive use of storage space with low cost equipment. Since records sent to centers have a low rate of reference they can be filed from floor to ceiling. One gets better utilization of the storage area and releases expensive office space for productive work. Other storage problems include protection from fire, dust, dirt, weather elements, and vermin. The possibility of atomic warfare creates a need for "atom-proof" storage facilities. If internal storage facilities are limited, then consideration should be given to storage by one of the records storage companies.

Phase VII: Maintenance

Maintenance of a program is a continuing process. Able supervision must be provided. Common problems to be resolved are:

1. Facilities must be provided for new records developed by departments due to expansion, laws, or regulations.

2. Transfer and inventory of records should be on a rotating annual basis. A time should be established for each department's annual review that will not conflict with peak business periods. The records manager can then assist in monitoring the review program.

3. If a records center is established, service is necessary for all departments. They must be confident that their records are in good hands. Records should be available on short notice. The time interval between request and delivery should be no more than one hour. If these requirements are observed, departments are likely to develop a reliance on the records center. Many times the information needed can be obtained by telephone at great money savings. A word of

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[1] For psychological reasons, many companies use the word "retention" rather than "disposition" to identify this phase of a records management program.

caution here, however: Records stored in "centers" are still departmental records so integrity must be maintained at the highest level. Access to the records center should be carefully restricted and monitored.

Phase VIII: Value Assessment

It is more important than most companies realize that the results of a records management program (or any continuing program) be evaluated periodically. Setting up a program is but an initial step and may be compared to a honeymoon. For continued results, consideration must be given to training programs for managers and operational personnel, to standard procedures, to usage, and to employee acceptance and participation. A records management improvement program can be promoted through group conferences, lectures, instruction clinics, and classes at cooperating educational institutions.

Mechanization of office activities should also be reviewed for its effect on records. Mechanization can have far-reaching effects. Value assessments many times lead to the problem of whether to centralize or not to centralize records management physically or functionally. *Functional* centralization under the records manager is necessary to a program's success. Physical centralization will depend on the nature of the business, size of the business, and materials to be filed. In any case, centralization has many advantages:

1. It eliminates duplication of equipment, folders, and guides. The original copy of a record is sent to a central file, or placed under a central authority; the balance of the copies do not need to be retained.
2. It provides uniform methods and procedures for filing in each department instead of miscellaneous filing systems.
3. It limits to one place the search for material in files.
4. It economizes in use of equipment and filing space.
5. It improves training and utilization of clerical personnel is improved.

A Case History[2]

In May, 1958, the City of Ann Arbor, Michigan, started a records management program. It was called appropriately, "Operation Heave-Ho." The situation before the program was as follows:

1. City administration was handled in 16 separate departments.
2. Related material was scattered throughout files in each department.
3. There was no control of material removed from files.
4. There was no records plan in the offices.
5. There were over 75 different classifications of records.
6. Office equipment in all offices was different.
7. Each department assumed responsibility for indexing, filing, and protecting records that originate in or reach its offices.
8. Many important records were entrusted to the secretaries of various department heads.
9. Locating specific files and records was on a hit-or-miss basis.

To start the program, the City Clerk, in conjunction with the City Planning Department, conducted a records inventory at the departmental level. Each record group was analyzed and evaluated for legal, administrative, reference, and historical value. In negotiating the preliminary Records Retention Schedule, it was necessary to get the approval of the departments concerned, the City Council, and the State Administrative Board before the program could be initiated. On approval, the program began with a thorough briefing of all departments on the new Records Retention Schedule. The City Clerk's office established a central records center for the storage, servicing, and security of all department records which were to be preserved for one year or more. Each department was standardized on the annual inventory requirements, records maintenance, the protection of vital records, and the orderly and systematic disposition of obsolete and useless records.

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[2] The program described in this case is not as inclusive as a records management program ideally can be. It is aimed primarily at developing a retention schedule.

The results of this program were the destruction, by burning, of 1½ tons of confidential files, and the sale of 10 tons of routine but outdated and obsolete files as waste paper. It was interesting to note that some of the correspondence dated back to 1885.

Today the program, despite city expansion and the need for a larger City Hall, runs smoothly and efficiently. Its publication, *Records Retention Schedule,* is much in demand by other cities and firms.

Summary

Planning a records management program can save valuable *space, time, energy,* and *money* if a few simple plans and procedures are followed:

1. Assign the program to one person and give him the authority and responsibility for the overall records management program.
2. Get management and line supervisors behind the records manager and program.
3. Establish a program and time table for implementing the various phases of the program.
4. Coordinate and secure approval for the proposed program before implementation.
5. Implement the program according to schedule, keeping everyone advised of any changes.
6. Monitor results carefully for possible problems. Keep a flexible and understanding attitude toward problem areas, and adjust as needed.
7. Evaluate the success of the program periodically to see if goals are reached and if the program is worth maintaining.
8. Plan future improvements in the creation and use of records. **s/p/a**

S&P Book Reviews

Richard W. Reynolds

Automatic Data Processing Systems *by R. H. Gregory and R. L. Van Horn, San Francisco, California: Wadsworth Publishing Co., Inc., 705 pp., 1960, $8.75.*

Here, at last, is the "complete data processor." In the past few years, there has been an avalanche of books on this subject but most of them have been too narrowly intensive or too broad. In this reviewer's opinion, this book is just right.

Designed as a textbook, and written under contract with the Massachusetts Institute of Technology, this book gives thorough coverage to the various processing units. Complete and understandable explanations are given of how they work. The authors discuss equipment which falls within the general context of the needs of business data handling. Theory is interwoven with practical business requirements.

The text is unusually clear. The reader can often catch the drift of a chapter by reading the two- or three-page summaries. The summaries also permit the reader to select for detailed study sections of particular interest to him. Charts and diagrams are clear and concise. Photographs are included in abundance; there is an excellent index. (Reviewed by James L. Freel, Allied Purchasing Corporation; Lincoln Center Chapter, SPA)

Management in the Industrial World: an International Analysis *by Frederick Harbison and Charles A. Myers, New York: McGraw-Hill Book Company, 413 pp., 1959, $7.*

Thanks to financial sponsorship by the Ford Foundation, Princeton University, and M.I.T., the authors were able to complete a distinguished pioneering effort in international comparative management. The expressed purpose of this study is to trace the logic of management development as related to industrial growth. The authors are concerned more with the dynamics of development and the basic trends of managerial growth with an analysis of particular practices. Emphasis is placed on the evolution of management and on the forces which are likely to mold its future development.

Part I (134 pages) includes the following chapters: Organization and Management, Management as an Economic Resource, Management as a System of Authority, Management as a Class, The Development of Managerial Resources, and The Logic of Management Development. Part II (257 pages) includes chapters on management in India, Modern Egypt, Chile, Israel, France, Italy, Japan, Germany, Sweden, Great Britain, and the Soviet Union, as well as American Management in Perspective, and Management of Foreign Firms in Economically Underdeveloped Countries.

Although some students of management may criticize the authors' omission of the foreman as a part of management, little else will disturb them. The comparative studies point out that, in practice, American management techniques remain unique; other countries simply do not copy them. This is not, of course, surprising to anyone familiar with "caste systems" in other societies. So long as management means dealings of men with men, differences in social practices will mean differences in management practices.

This book points out that American management practices, as a whole, are far from perfect. Apparently, we are doing more than any other country to develop increasing numbers of competent managers at all levels who are vitally essential to any economically progressive country. No one seriously concerned with management methods can afford to remain indifferent to this book. (Reviewed by Ernest Huebner, General Aniline & Dye Corporation.)

Measurement and Evaluation of Organizational Performance *(an annotated bibliography) by Paul Wasserman, Ithaca, N. Y.: Graduate School of Business and Public Administration, Cornell University, 110 pp., 1959, $3.75.*

This publication is a worthy service for all students of management.

Management has long been concerned with finding answers to the thorny problems of evaluating accomplishment. Although much has been published in this area, few attempts have been made to classify the literature. Most material on measurement and evaluation deals with technical activities at the basic organizational levels; administrative activity has been a more elusive concept to measure.

In addition to business and public administration, the author includes selections from military, education, library, and health administration published between 1945 and September, 1958. The abstracts are descriptive rather than analytical. The author states that criticism has been exercised only by virtue of inclusion or exclusion.

The bibliography is divided into four main parts: I. Measurement and evaluation—General and Theoretical Material, II. Measurement of the Total Enterprise, III. Measurement of the Functional Units of Organizations, and IV. Measurement of Individual Performance. Two indexes are included: 1. By author; 2. By title.

This reviewer recommends the bibliography without reservation to anyone who is interested in the study of management problems. (Reviewed by Frederick Renner, Administrative Services, U. S. Postal Department.)

Motion and Time Study *by Marvin E. Mundel, Englewood Cliffs, N. J.: Prentice Hall, Inc., 690 pp., 1960, $11.95.*

Motion and Time Study is definitely not light reading. Mr. Mundel sets a course early in the book and covers his subject matter in detail. Although he does not say so, his book was evidently written to serve primarily as a text. It appears to cover the entire area of motion and time study and includes many examples of the practice of same. The book begins by taking the reader through the thought processes involved in doing a motion study. It then describes the tools available for motion study and the application and use of results. The reader is next taken through the same application with time study. Since time study is a little more interesting to a systems man than motion study, the second half of the book was more appreciated by this reviewer. The chapters on "Statistical Time Standards" and "Applying Standards" are of particular interest. They help the reader realize the true lack of time standards in industry today. The book is well documented and has one of the most exhaustive bibliographies this reviewer has seen.

As stated previously, the book seems to be basically a text. It is doubtful that the average systems man will get through it without some help. The style is heavy and not easy to follow. Much of the sentence structure is long and complicated. For these reasons, the book is recommended only if systems men have some particular interest in taking a detailed look at motion and time study. (Reviewed by Michael J. Lonergan, Chas. Pfizer & Co.; Long Island Chapter).

Programming Business Computers *by Daniel D. McCracken, Harold Weiss and Tsai-Hwa Lee, New York,: John Wiley & Sons, 510 pp., 1959,* $10.25.

Frequently these days, it seems, a new book shows up that is a *must* for systems people. This is such a book. Its great value lies in its ability to communicate, simply and easily, information that is important to people trying to get better performance in today's changing technical environment. The book is so written that even the rawest initiates should be able to grasp from it the elements of efficient programming of EDP equipment. At the same time, so many of the latest techniques are presented, that the more experienced EDP Systems man certainly will want to have the book on hand. The hypothetical computer constructed by the authors for the applications presented is called the DATAC. The principles are easily transferred to other computers.

Chapters 1-4 present background information for understanding the elements of EDP. Chapters 5-12 do an excellent job of explaining programming and coding; numerous examples are presented. Chapters 13-19 consider advanced topics of exceptional interest to the experienced. Chapters 20 and 21 summarize steps involved in getting a computer application going, and takes a critical look at accounting and auditing problems associated with EDP.

Exercises are provided at the end of each chapter, thus the book may serve as a text for a formal programming course. (Reviewed by Richard W. Reynolds, F. W. Lafrentz & Company; Lincoln Center Chapter, SPA)

The Punched Card Data Processing Annual, *Detroit, Michigan: Gille Associates, Inc., 956 Maccabees Bldg., 239 pp., 1959, $15.*

This publication is divided into three main sections: The Computer Guide, Applications, and Wiring Tips and Techniques.

The Computer Guide contains a comparison chart and some 29 pages, each of which contains a half-page picture and a description of different computers.

Applications contain 164 pages about different applications of data processing equipment (practically all punched cards) under the following headings: Invoicing, Sales Analysis, Inventory Control, Accounts Receivable, Payroll, Accounts Payable, General Ledger, Production Control, Cost Accounting, Operations Research, and others.

Wiring Tips and Techniques (30 pages) include 10 articles about the intricacies of punched card processing.

A final section of some 29 pages is entitled: Directory of Local Sources of Data Processing Supplies and Services.

In this reviewer's opinion, the information contained in the first two sections is already available in other reference material. However, the *Applications* section is worthwhile and can be studied by any systems man, whether directly concerned with punched cards or not. The *Wiring Tips and Techniques* section will not mean too much to him unless he knows about wiring a control panel although it can serve the worthwhile purpose of stimulating his interest in this important area. (Reviewed by Frederick Jacobs, Haggerman Associates; Long Island Chapter, SPA)

Work Improvement *by Guy C. Close, Jr., New York: John Wiley & Sons, Inc., 388 pp., 1960, $7.75.*

This book is a presentation of work simplification techniques for supervisors although the term "work simplification" is avoided. The author explains (p. 316) that it frequently connotes job de-skilling.

The presentation is made in five parts: The first two discuss work improvement in industry, brief its development, stress the value of a questioning attitude applied with common sense in areas needing improvement, and present a quick course in economics and accounting for supervisors. The next two parts state techniques and methodology of work improvement. The final part is a general discussion of how to apply the techniques and includes a chapter on suggestion systems.

The book purports to deal with both office and factory areas but favors factory methods. A 25-page chapter on "Office Procedures" does little more than nod briefly to such subjects as forms improvement, filing practices, and duplicating costs. Other aspects of the systems job are not mentioned.

From the systems man's point of view, the book does not contain a significant contribution. As a whole, it lacks a sound underlying philosophy of the supervisor-worker relationship. The author does not differentiate between motivation and manipulation. It is this reviewer's point of view that techniques in themselves are of little value. Results are achieved through cooperation among participating individuals. Lacking such cooperation, a program has poor chances of success.

The chapter entitled "Installation—A Problem in Human Motivation" says, "We motivate people when we make them desire to do what we want them to do." This, in the opinion of the reviewer, smacks of paternalism and is further illustrated throughout the chapter by such phrases as "get him in the proper frame of mind . . .", "give him . . .", "let him . . .", and "have him explain . . ."

The title of this book recalls *Work Simplification* by Robert N. Lehrer (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 394 pp., 1957). As illustrated by the following quotation, he expresses in it a managerial philosophy which seems to contrast with that of Mr. Close's book: "The fundamentals upon which my material is based have to do with the importance of man—the individual—and the dignity of work."

The strength of *Work Improvement* lies in its excellent illustrations of methods improvement through scores of text examples, photographs, and line drawings. Aside from these, however, this reviewer believes the book has little to offer a systems man. (Reviewed by Richard W. Pomeroy, Arthur Young & Co.; Lincoln Center Chapter, SPA)

s/p/a

Worth Reading

S. Joseph Schneider

"Buy, Lease, Share a Computer — Or Utilize a Service Bureau?" Charles G. Abbott, *Computers and Automation,* February, 1960.

The author assumes that use of a computer is justified and the article explores alternative ways of financing it: buy, lease, share, service bureau. The material is based on a presentation made to an AMA seminar. The conclusion is that the best decision is to buy a system and operate it on a two-shift basis for more than 52 months.

"Choosing a Microfilm System," Ernest P. Taubes, *Data Processing and Microfilming Systems,* April, 1960.

A general introduction to the three types of microfilming available: 35 mm, 70 mm, and 105 mm.

"How Work Measurement 'Cliches' Cut Clerical Costs," Robert A. Miller, *The Controller,* March, 1960.

A detailed, illustrated statement of a work measurement program at State Mutual Life (Worcester, Mass.). Predetermined motion time values were used and 600 of 1,000 total employees were covered by the program after 19 months. A consultant was used and three in-house analysts were assigned full time to the program. A reduction of 20 per cent in the work force was achieved through attrition. The program followed closely the oft stated principles of a successful work measurement system, hence the title.

"How to Cut Timekeeping Costs with an Intercom System," *Management Methods,* January, 1960.

Describes Webster Electric Company (Racine, Wisconsin) experience in phoning direct labor time. The system consists of a separate intercom between 54 production-reporting stations and timekeeping. Reports are made immediately after a job is completed and at the end of the day.

"This Personnel Form Does an All-Purpose Job," Kenneth F. Sheehan, *Management Methods,* April, 1960.

Describes an integrated personnel data system for about eight thousand employees, used by the Stromberg Carlson Division of General Dynamics (Rochester, N. Y.). A master personnel record is typed on a Flexowriter. Two by-product tapes are obtained. One is kept in a pocket of the master form; the other creates two daily reports on personnel actions and five punched cards: personnel skills, payroll, attendance, probation review, and employee address.

"Make Inventory Reports News — Not History," *Modern Office Procedures,* April, 1960.

A detailed, illustrated description of inventory control used by National Aniline Division of Allied Chemical and Dye (Buffalo, N. Y.). A change was made from a manual to a bookkeeping-machine system. Previously, five clerks handled 1,000 stock ledger entries a day for 12,000 stocked items; cards were punched after the entries. Now, two clerks and a bookkeeping machine do the same work and a by-product punched tape eliminates the extra card punching step.

"Control: A Brief Excursion on the Meaning of a Word," E. S. L. Goodwin, *Michigan Business Review,* January, 1960.

Considers the derivation of the word *control* and its use in management.

"Know Your Government Contracts," Raymond B. Jordan, *NAA Bulletin,* March, 1960.

A brief non-technical introduction to the major types of government contracts. Variations of cost-reimbursement and fixed contracts are covered.

"How Much Data Screening to Minimize Computer-Detected Errors?" Phillips S. Cruttenden, *NAA Bulletin,* April, 1960.

Presents an equation designed to compare the cost of finding and correcting errors manually with the cost of detecting them during a regular computer run of the data. The major conclusion is to have clerks correct errors, if noted, but not to attempt detection of errors that a computer has been programmed to check.

Publishers:

1. *Computers and Automation,* Berkeley Enterprises, Inc., 815 Washington St., Newtonville 60, Mass.
2. *The Controller,* Journal of the Controllers Institute of America, 1 East 42nd St., New York 17, N. Y.
3. *Data Processing and Microfilming Systems,* Data Processing Publishing Corp., 10 E. 40th St., New York 16, N. Y.
4. *Management Methods,* Management Magazines, Inc., 141 E. 44th St., New York 17, N. Y.
5. *Michigan Business Review,* School of Business Administration, University of Michigan, Ann Arbor, Mich.
6. *Modern Office Procedures,* Irving B. Hexter, 812 Huron Road, Cleveland, Ohio.
7. *NAA Bulletin,* National Association of Accountants, 505 Park Avenue, New York 22, N. Y.

s/p/a

INTERNATIONAL COOPERATION

▶ In the Far East and in South America, various methods were used to keep a pail of food cold. Some buried the pail in mud. Some lowered it down a well. Some contrived ingenious wire-screened cupboards with cross-currents of air in which to store more perishable commodities. All were striving for optimum food preservation. It was only after communication barriers diminished and sales approaches improved that better methods and refrigerators were finally made available to them.

In most parts of the world today there is a similar groping for optimum results in business administration. The search goes on in offices, factories, shops, and maintenance yards. The *how, why, when, what,* and *where* are queried. Meanwhile, business techniques grow apace and include automation, electronic computers, random access, serial storage, inertial programming, etc. And the need for effective communication about their development and use in all parts of the world is just as great as it once was for information about efficient refrigeration.

Even in the United States, the total systems concept has been realized only recently. The place of systems men at the corporate table is just being determined. What is systems and procedures? Is it being accepted? What is its job? Who are the practitioners? How are they to be trained?

No doubt the common need of management for clearly defined, dynamically applied, and methodical ways of processing information has been responsible in part for the evolution of systems and procedures men. Some of the acceptance of systems and procedures men at the corporate table is due also to the work of the Systems & Procedures Association. Unfortunately, we still have a long way to go.

It is up to SPA members in particular, to apply logic, resourcefulness, and imagination in systems and procedures work far afield. Communication barriers of all types must once again be overcome. The writer hopefully foresees the day when SPA chapters will exist in every country which feels the need for systematic processes in business administration. He foresees a world-wide interchange of systems and procedures information which will make it possible for everyone to get optimum results. *(Peter Uriarte, member, Caracas Chapter, Venezuela, and Editor, Caracas SPA* Newsletter) **s/p/a**

The
INTERNATIONAL
SYSTEMS
MEETING
1960

HOTEL BILTMORE
HOTEL COMMODORE
New York City

October 10-11-12-13, 1960